Value of Nature

The Investment Case for Nature-based Solutions

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Executive Summary

Nature loss is emerging as a systemic economic and financial risk, undermining the Ecosystem Services (ES) that underpin productivity, resilience, and human well-being. Despite growing policy ambition, particularly under the Kunming-Montreal Global Biodiversity Framework and EU Nature Restoration Law, current financial and economic systems continue to undervalue nature, resulting in underinvestment in nature-based solutions (NbS). This report addresses a central challenge of how to translate the broad societal value of NbS into actionable financial logic that can mobilize investment at scale. Commissioned by the Dutch Ministry of Agriculture, Fisheries, Food Security and Nature (LVVN), this study examines how Ecosystem Service Valuation (ESV) can support the scaling of finance for NbS. It demonstrates that ESV is a strategic tool to clarify value creation, reveal the distribution of costs and benefits across stakeholders, and inform the design of financial mechanisms and Public-Private Partnerships (PPPs).

The analysis combines literature review, expert interviews, and two in-depth case studies: a landscape-scale reforestation initiative in the United Kingdom (Avon Needs Trees) and a regenerative agriculture transition in Spain (El Roble Farm). Across both cases, the findings show that NbS generate substantial increases in Total Economic Value (TEV), primarily driven by regulating and cultural ES such as climate regulation, water management, biodiversity, and recreation. These benefits are often widely distributed across society and accrue over long time horizons, while costs remain concentrated among a limited number of actors. This structural mismatch between value creation and financial capture explains why NbS remain underfinanced despite their strong societal returns. Conventional appraisal frameworks prioritize short-term, monetized cash flows and systematically underrepresent non-market benefits, creating a bias in favor of grey infrastructure alternatives. ESV addresses this gap by making the full bundle of ES visible and comparable, enabling more informed and equitable decision-making.

The study also identifies further key barriers to scaling NbS finance. These include fragmented methodologies, lack of standardized metrics, limited data availability, and insufficient integration of ESV into financial and policy frameworks. Without a shared valuation language, NbS struggle to gain credibility and comparability in investment contexts. PPPs emerge as a critical mechanism to address these challenges. The report shows that ESV can serve as a common evidence base within PPPs, informing three core design dimensions:

1. Capital design: aligning funding contributions with value distribution;
2. Value recognition: integrating ES into financial decision-making; and
3. Governance alignment: ensuring enabling policy and institutional frameworks.

By clarifying who benefits from which services, ESV supports more proportionate and transparent allocation of financial responsibilities.

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List of Acronyms

***ES** - Ecosystem Services*
***ECB** - European Central Bank*
***GBF** - Kunming-Montreal Global Biodiversity Framework*
***NbS** - Nature-based Solutions*
***LVVN** - Dutch Ministry of Agriculture, Fisheries, Food Security and Nature*
***RVO -** Netherlands Enterprise Agency*
***TEV** - Total Economic Value*
***BAU** - Business-as-Usual*
***ESV** - Ecosystem Service Valuation*
***NC** - Natural Capital*
***NCA** - Natural Capital Accounting*
***TNFD** - Taskforce on Nature-related Financial Disclosures*
***PPP** - Public-Private Partnership*
***FSD** - Foundation for Sustainable Development*
***ESP** - Ecosystem Services Partnership*
***ESVD** - Ecosystem Services Valuation Database*
***WRI -** World Resources Institute*
***WUR** - Wageningen University & Research*
***VU** - Vrije Universiteit Amsterdam*
***IISD** - International Institute for Sustainable Development*
***UN** - United Nations*
***UNEA** - United Nations Environment Assembly*
***IUCN** - International Union for Conservation of Nature*
***EIB** - European Investment Bank*
***FfB** - Finance for Biodiversity Foundation*
***OPEX** - Operating Expenses*
***CAPEX** - Capital Expenditures*
***CES** - Cultural Ecosystem Services*
***TEEB** - The Economics of Ecosystems and Biodiversity*
***PES** - Payments for Ecosystem Services*
***NGO** - Non-Governmental Organizations*
***SEEA** - System of Environmental Economic Accounting*

Chapter 1: The challenge of nature loss

"Here's the conundrum: No country has ever ended human deprivation without a growing economy. And no country has ever ended ecological degradation with one."

- *Kate Raworth (Raworth, 20017)*

1.1 Nature loss in its policy and economic context

The degradation of biodiversity and ecosystems is eroding the very foundation of our economies and wellbeing by diminishing essential Ecosystem Services (ES) such as pollination, water purification and flood regulation. The European Central Bank (ECB) has shown that a decline in just one service, surface water availability, could put almost 15% of Europe economic output at risk, underscoring the need to integrate multiple ES values and risks into financial risk assessment frameworks (Ceglar et al., 2025). This challenge is now firmly on the international policy agenda. The Kunming-Montreal Global Biodiversity Framework (GBF) sets ambitious targets for 2030 and 2050, while the Nature Restoration Law calls for restoring degraded ecosystems, phasing out environmentally harmful subsidies, and for private capital to be involved in reaching Nature Restoration goals (European Union, 2024).

At the same time, climate adaptation is rapidly gaining importance. Nature-based solutions (NbS) to climate change are gathering considerable traction, as studies are reporting more synergies than trade-offs between reduced climate impacts and broader ecological, social, and climate change mitigation outcomes (Chausson et al., 2020). Climate and biodiversity risks are intertwined, and both must be addressed simultaneously if we are to maintain economic stability and societal resilience.

Yet, as was already pointed out in the Dasgupta Review in 2021; *"we are still plundering the planet because of outdated economics"* (Dasgupta, 2021). Our current systems of national accounting and financial decision-making largely ignore the dependency of economies on nature, and the costs of nature loss remain externalized.

1.2 Why this project - assignment, goal and focus

With the GBF 2030 targets now just five years away, the need to accelerate action has never been greater. This report speaks directly to the GBF ambition to **(i)** improve the sustainability of production systems and land use, **(ii)** restore degraded ecosystems and strengthen ES, **(iii)** mainstream biodiversity into decision-making by governments and the private sector, and **(iv)** shift financial flows away from nature-negative incentives and toward nature-positive investment. In practice, this aligns most closely with GBF Targets

10, 11, 15, 18 and 19, and with the challenge that sits underneath all of them: making the benefits of nature visible and usable in real-world choices.

Doubling down on our efforts therefore means forming new alliances across sectors and disciplines, connecting knowledge silos, facilitating international knowledge exchange and capacity building, and, crucially, clarifying how Ecosystem Services Valuation (ESV) can help translate ecological performance into financially actionable information. Against this backdrop, this project was commissioned by the Dutch Ministry of Agriculture, Fisheries, Food Security and Nature (LVVN), with the central objective of:

Analyzing and demonstrating how ESV can support the scaling of finance for NbS, by clarifying value creation, revealing public-private benefit distribution, and informing the design of financial structures and Public-Private Partnerships (PPPs) that enable investment at scale.

Rather than treating valuation as an abstract exercise, this study focuses specifically on how ESV can improve investment logic, reduce information asymmetry between public and private actors, and strengthen the enabling conditions required to mobilize both public and private capital for NbS.

FSD - ESVD, ESP and the knowledge base

The Foundation for Sustainable Development (FSD) works to make nature count in decisions that shape our economies and societies. Through its flagship programs, the Ecosystem Services Partnership (ESP) and the Ecosystem Services Valuation Database (ESVD), the FSD connects science, policy and practice to ensure that the value of nature is visible, measurable and usable.

The ESVD gathers and provides free access to standardized monetary values of ES provided by all types of ecosystems across the globe. These values reflect the “true” contribution of ecosystems to human wellbeing. By communicating these values in a consistent format, the ESVD provides recognizable information that can be used to internalize the importance of nature in policy, planning and financial decision-making. The ESVD has grown into the largest publicly available database and tool offering standardized monetary values of ecosystems and their services (esvd.info, 2024). It is fed by over 30 years of peer-reviewed academic research and official reports on monetary valuation of ES and currently contains 12,390 value records from over 1,475 studies distributed across biomes, ES and geographic regions (esvd.net, 2025).

1.3 Methods used in this study

To understand how ESV can support the scaling up of NbS, we combined three complementary approaches: preliminary desk research, expert consultation, and case study analysis.

Literature and policy review

We conducted a targeted review meant to serve as a theoretical framework for our analysis. The parting point of this study lies in key international and European Union (EU) policy frameworks, including the GBF, and EU Nature Restoration Law. On top of this, recent financial and NbS-focused publications were also reviewed, with particular emphasis on: *Investing in NbS: State-of-play and way forward for public and private financial measures in Europe* (European Investment Bank (EIB), 2023), the ECB's climate-nature risk and ES analysis (Ceglar et al., 2025), and World Resources Institute (WRI) *Financial Sector Guidebook on NbS Investment* (Ding and McLaren, 2025). This review provided a structured understanding of the latest scientific, financial, and policy developments relevant to NbS and its valuation, and from which to scope and target this study.

Targeted expert interviews

We conducted over 15 semi-structured interviews across the financial, policy, scientific, and implementation contexts. Insight and quotes collected during these interviews are included throughout the next chapters, and wherever relevant to strengthening our own review. Interviewees represented: **(1)** financial institutions: Triodos Bank, Invest-NL, Finance for Biodiversity Foundation, Pictet, **(2)** NbS developers and engineering firms: EcoShape, Royal HaskoningDHV, NL2120, **(3)** knowledge partners: Wageningen University and Research (WUR), Vrije Universiteit Amsterdam (VU), ESP, NetworkNature, International Institute for Sustainable Development (IISD), **(4)** policy actors: LVVN, Region of Trento, EU NetworkNature, and **(5)** emerging financing and governance initiatives: Bioregional Financing Facilities. Interviews were conducted via online meetings, written exchanges, and in-person conversations. Across these diverse perspectives, we identified key barriers and enablers to integrating ESV into real-world decision-making, knowledge and capacity gaps in finance and policy communities, and opportunities for public-private collaboration to strengthen the evidence base and investment logic for NbS.

Case study selection and analysis

To illustrate how ESV can clarify the added value of NbS compared to Business-as-Usual (BAU) alternatives, we reviewed a broad set of Dutch and international NbS cases (agricultural, wetland restoration, reforestation, infrastructure-related). From this, two cases were selected following the criteria detailed in Chapter 3.

Chapter 2: Nature-based Solutions as part of the answer

"Our system is clearly all about money, so we need more economic proof that NbS delivers value"

- *Esmee Kooijman (LVVN)*

2.1 What are NbS, and why they matter for climate adaptation and financial sector

The clearest signal of policy-driven momentum is that NbS are shifting from optional "nice-to-have green projects," to instrumental in delivering public mandates on resilience and restoration. Most notably through the GBF, which explicitly calls for ecosystem restoration and NbS-type approaches (Target 11), and through the EU Nature Restoration Law (EU Commission, 2024), which creates long-term obligations for restoration and implementation conditions that inevitably pull valuation and financing questions into the foreground.

The EU Nature Restoration Law states that the Union and its Member States are committed to a long-term vision in which, by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ES, sustaining a healthy planet and delivering benefits essential for all people (European Union, 2024). NbS, integrating energy, food production and biodiversity enhancement (van Hattum et al., 2023), are central to this vision. In addition, nature-based interventions are most often shown to be as effective, if not more effective, than alternative interventions for addressing climate impacts (Chausson et al., 2020).

Reflecting this potential for climate adaptation, there has been a sharp increase in the number of investment funds dedicated to Natural Capital (NC) and NbS, indicating a maturing market and a growing appetite from investors to fund nature. Examples include ASN Bank's Impact Investors' Biodiversity Fund, Climate Asset Management's Nature Based Carbon Strategy, Federated Hermes' Biodiversity Equity Strategy, Mirova's Sustainable Ocean Fund and SLM Partners' Silva Europe Fund (GFI, 2024). However, while NbS comprise around a quarter of the most cost-effective climate actions, they remain at the margins of global finance, particularly among institutional investors (GFI, 2024; Hudson et al., 2023). Several recent reports highlight both the need and possibility of integrating ES valuation into NbS finance:

- The **ECB** demonstrates how changes in ES (e.g. surface water availability) can translate into macroeconomic and financial risks, arguing for the integration of ES-related risks into risk assessment frameworks (Ceglar et al., 2025).

- The **EIB** review of public and private financial measures for biodiversity draws lessons from the Natural Capital Financing Facility (NCFF), a pilot financing instrument for projects addressing biodiversity and ES loss, implemented between 2015 and 2022 (EIB, 2023).

- The **WRI Financial Sector Guidebook on NbS Investment** explicitly recommends using the ESVD for direct nature-based development investments and outlines steps for measuring and managing impact, including ES valuation (Ding and McLaren, 2025).

Together, these developments show growing demand from financial institutions for credible, comparable and decision-relevant valuation of NbS impacts. Our interviews with financial institutions reflected this in stating how important it is for Finance for Biodiversity (FfB) that NbS be presented as part of mainstream economic models, generating benefits in terms of returns, resilience, and risk management (Invest-NL and Finance for Biodiversity Foundation). NbS should be considered by companies and financial institutions in decision-making and economic analysis as a source of stability and key tools for sustainability; to advance practices from reducing pressures to effectively generating biodiversity gains towards nature-positive goals.

Box 1 *Role of early-stage ESV) in supporting the transition of NL2120 from strategic vision to implementable, financeable NbS.*

NL2120, the national program aimed at designing a climate-resilient and nature-positive Netherlands, places NbS at the core of long-term spatial planning. As the initiative moves from conceptual frameworks toward implementation, the need for structured valuation becomes increasingly urgent. The NL2120 partners we consulted (EcoShape, Royal HaskoningDHV, and Wageningen University & Research) emphasized that valuation is emerging as a critical pressure point. Once projects advance beyond vision and design into delivery and financing, stakeholders require tools that clarify ecological trade-offs, quantify socio-economic benefits, assess long-term performance under climate change, and compare NbS credibly with conventional grey alternatives. This reinforces the central argument of this study: early-stage ESV is not an optional add-on, but a necessary pathway for translating spatial ambition into financially robust and policy-aligned implementation.

Against this backdrop, NL2120 functions as a strategic bridge within a broader European transition. The program operates precisely at the intersection where policy ambition, practical landscape design, and financing requirements converge. At this juncture, early-stage ESV becomes both a bottleneck and an accelerator: without it, ambitions struggle to translate into credible investment cases; with it, concepts can evolve into investable and governable projects.

Across Europe, the shift towards NbS is real, but uneven. Momentum is emerging through a reinforcing set of drivers: **(i)** binding policy direction (restoration, adaptation, and subsidy reform), **(ii)** rapidly expanding implementation evidence and project pipelines, and **(iii)** growing, though still selective, uptake by systemic actors (public infrastructure agencies, cities, water authorities, development banks, and parts of the financial sector.

At the same time, momentum is visible in the rapid consolidation of practice-based evidence and enabling finance agendas. For example, the EIB and wider EU finance community increasingly treat NbS as a serious investment and policy topic (EIB, 2023), explicitly analyzing what holds back scaling and what public–private measures could unlock it (Favero, 2024). The implementation ecosystem is also widening: platforms such as IISD's Nature-based Infrastructure work and international convenings showcase growing pipelines of NbS examples and implementation learning, while global biodiversity and climate conferences increasingly feature NbS as a practical delivery pathway rather than a purely conceptual ambition (Partners for Water, 2024; EIB, 2024).

2.2 Why scaling finance remains difficult

Despite the growing reliance on valuation, a critical barrier to the legitimacy and scalability of NbS is the absence of harmonized knowledge, metrics, and methodologies. Multiple experts highlight the fragmentation in current practice: there is a lack of standardized metrics across stakeholders, which hinders consistent communication and comparison of NbS benefits, and project overviews don't give the information you need due to inconsistent units and descriptions. The lack of a shared measurement language undermines credibility, making cross-project aggregation, investment benchmarking, and policy learning nearly impossible. This discourse reveals a deep knowledge network challenge: without comparability, valuation remains isolated and subjective, vulnerable to accusations of greenwashing or bias. The final and unifying discourse is the urgent need for transparent, standardized methodologies to ensure credibility, comparability, and trust in NbS outcomes. Project interviewees call for shared definitions and measurements, warning that without them, financial institutions cannot assess projects effectively. Interviewees suggest the need for standard values for ES. Some even suggest that accounting frameworks could bring more standardization into this area, mirroring established financial reporting systems. Others insist on transparency, advocating for clear methodological boundaries to prevent misleading or partial assessments.

This targets a lack of a comprehensive and commonly applied typology covering a representative variety of ES that captures the magnitude and timing of synergies and trade-offs required to assess financial and economic performance (Lozano et al., 2025). While several typologies and frameworks already exist, such as the NbS typology developed by NL2120 and sector-specific studies like the CNI-Witteveen+Bos work on water-related NbS, these all highlight the need for a shared and operational understanding of what constitutes NbS across contexts and sectors.

Box 2. *ES, NC, and the Role of Valuation*

ES can be defined as the direct and indirect contributions of ecosystems to human wellbeing (de Groot et al., 2012). Biodiverse ecosystems provide a wide array of essential ES when they are in good condition, but the ongoing decline of ecosystems and biodiversity spells the loss of a wide array of ES essential to the maintenance of human well-being and society (Costanza et al., 2014). These services underpin diverse socio-economic gains, for both public and private stakeholders, shaped by the specific economic, social, cultural, regional, and local contexts. Restoring degraded ecosystems across land and sea delivers benefits that far exceed the costs of restoration, but our current economic system is lacking the information needed to account for these current and future losses.

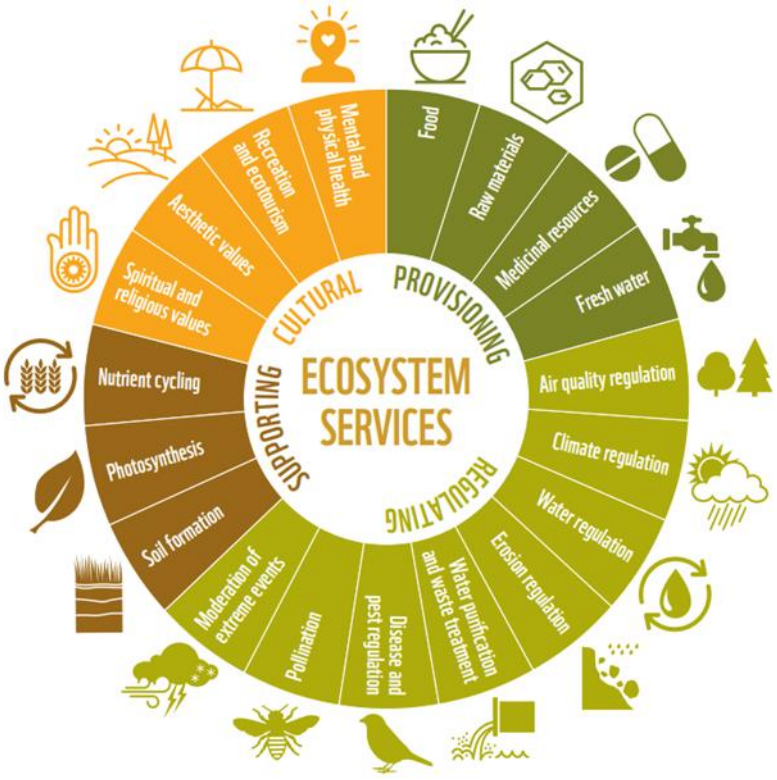

Figure 1*. ES. Provisioning services are the products obtained from ecosystems, Regulating services are the benefits obtained from the regulation of ecosystem processes, Cultural services are the nonmaterial benefits people obtain from ecosystems and Supporting services are those services that are necessary to produce all other ES (World Wide Fund for Nature, 2016).*

In guiding these decisions regarding the trade-offs in ecosystem management, land-use change, or any activity impacting ecosystems and biodiversity, ESV offers empirical evaluation of the importance of

these ES to our well-being (Brander et al., 2024). ESV makes the benefits of nature visible, revealing its crucial importance, and quantifying damage to its value, for individuals, society, business, finance, and the whole economy. In this context, ESV offers a way to quantify the flows of benefits (ES) from different land-use choices, a means to compare NbS with BAU options on more than just direct revenues and, a bridge between ecological performance and financial or socio-economic decision metrics. Research has begun to quantify the ES contributions of NbS in diverse domains such as agriculture (Zanini et al., 2024), river catchments (Di Grazia et al., 2021) and flood management, among others. These services support socio-economic gains for both public and private stakeholders, shaped by local and regional contexts. Restoring degraded ecosystems across land and sea delivers benefits that far exceed restoration costs, but our current economic system often lacks the information needed to account for these future losses and gains (Costanza et al., 2014).

NC refers to the global stock of renewable and non-renewable natural resources; plants, animals, air, water, soils and minerals, that combine to yield a flow of benefits to people (Global Footprint Initiative (GFI), 2024). NC has increasingly been recognized as a missing pillar in economic and financial decision-making, providing a language for environmental profit-and-loss statements and for understanding the financial materiality of biodiversity and ES loss (Taskforce on Nature-related Financial Disclosures (TNFD), 2024; Blarel et al., 2023; Barker, 2019).

2.3 Scaling up financing NbS: What ES Valuation Reveals

In 2022 the United Nations (UN) General Assembly adopted a common framing and definition of NbS as those actions that protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human wellbeing, ES and resilience and biodiversity benefits (UNEA, 2022; IUCN, 2025). When implemented well, NbS can enhance ecosystem resilience and health, increase the supply of multiple ES (e.g. flood protection, water quality and retention, crop pollination, recreation), and deliver direct and indirect benefits to local communities and wider society (Ding and McLaren, 2025) (**Figure 2**). Yet many of these benefits are either not monetized, not integrated into conventional cost–benefit analysis, or not attributed to clearly identifiable stakeholders. As a result, NbS are frequently assessed only on their direct, project-level financial returns (e.g. crop yields, timber sales, avoided infrastructure costs), while broader regulating and Cultural Ecosystem Services (CES), such as flood mitigation, heat reduction, pollination, carbon sequestration, health benefits, and social cohesion, remain external to the financial appraisal.

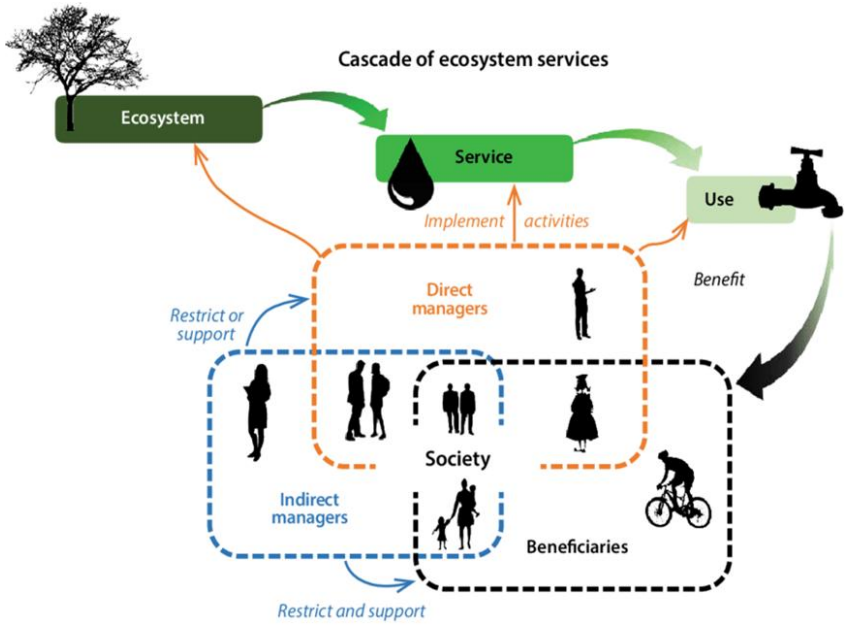

Figure 2. *Analytical framework with two forms of ES management (direct and indirect), which can occur at three steps of the ES cascade (ecosystem, service, use) (Vallet et al., 2020)*

Designing and financing NbS is, at its core, always about making trade-offs between benefits and burdens: who gains what, who bears which costs, and over which timescales. In the current neo-liberal economic paradigm, the organizing principle for these trade-offs is often efficiency; maximizing quantifiable output per unit of input. In practice, "efficiency" is usually operationalized through narrow technical or financial metrics (capital expenditure (CAPEX), operational expenditure (OPEX), yield per hectare, cost per unit), which only capture a limited subset of what ecosystems provide. Conventional appraisal frameworks tend to prioritize short-term, directly captured cash flows and clearly assignable revenues. Grey infrastructure alternatives often generate easily measurable outputs (e.g. cubic meters of water pumped, kilometers of dike reinforced) that fit neatly within existing budgeting and procurement models. NbS, however, typically generate distributed, cross-sectoral, and long-term benefits that accrue to multiple actors across administrative boundaries. When these broader benefits are excluded or treated qualitatively, NbS can appear more costly, more uncertain, and more complex than grey alternatives, even when their total societal value is higher.

This structural underrepresentation of ecosystem-service flows in economic appraisal creates a systematic bias in favor of conventional solutions. ESV directly addresses this bias by making visible the magnitude, distribution, and timing of NbS-related benefits, enabling more complete and transparent comparisons between NbS and Business-as-Usual interventions. Because many ES fall outside this

efficiency lens (Panaro et al., 2025), especially in the cases of non-market and relational values, they tend to drop out of the design of financial products, infrastructure plans or land-use strategies. Even when multiple ES are considered, the services that do not fit easily into a technical efficiency framework are often treated as “nice to have” rather than essential. The result is a structurally incomplete benefit-burden assessment, in which a small set of monetized flows dominates decisions, while a much larger set of ecosystem contributions remains invisible or underweighted.

ESV directly addresses this gap, as ES are benefits from nature to people by definition; behind every ES there are beneficiaries. If there are no beneficiaries, it is not a service. This means that any intervention, solution or project that interacts with ecosystems should, in principle, examine the full bundle of ES affected, not just food, fiber and carbon. Only then is it possible to understand the true pattern of trade-offs: which benefits increase, which are lost or displaced, and for whom.

Previous work with the Netherlands Enterprise Agency (RVO, 2024) showed that quantifying Total Economic Value (TEV) and ES impacts under different scenarios fits well with the concept of NbS, particularly in making the value of nature less abstract for decision-makers (Siebers et al., 2024). Stakeholder consultations in that project revealed a clear gap: ES value estimates are often understood as “important” but remain too abstract to guide concrete choices between NbS and BAU interventions, especially at the early design stages when projects, budgets and responsibilities are not yet locked in.

Monetary valuation of ES is a practical indicator of the order of magnitude of gains and losses. It provides a common language to quantify and compare benefits and burdens across very different dimensions, without pretending that all values are purely financial. In fact, the concept of ES itself shows that benefits are not only monetary: recreation, health, identity, cultural continuity and intrinsic values are all part of the picture. Many of these are captured in categories such as aesthetic value, noise regulation and soundscape quality, educational values, existence and bequest values. There is decades-long international consensus that these are legitimate ES, and not soft add-ons. Excluding such services from analysis because they are considered too intangible is therefore a categorical error. It ensures that their beneficiaries are structurally underrepresented in decisions. This is one of the reasons why a narrow efficiency paradigm has contributed to ecosystem depletion: benefits that are not made visible remain outside the decision frame, and what lies outside the decision frame is systematically marginalized.

For this very reason, we argue in this report for early-stage, inventory-type assessment of ES, rather than only deep, project-specific ES analyses at the end of the design process. In the early phases of an NbS or investment, a broad ES assessment, supported by monetary valuation where possible, can map the full bundle of affected ES, including cultural and regulating services that normally stay out of sight, indicate the order of magnitude of gains and losses per service category, reveal the diversity of beneficiary groups (local communities, downstream users, public authorities, companies, future generations), and provide a more reasonable, inclusive and transparent basis for trade-offs between benefits and burdens.

Chapter 3: The Case Studies - NbS in The UK and Spain

This chapter uses two case studies to illustrate how ESV can make these effects visible and comparable, and how that in turn informs the design, financing and scaling of NbS. The emphasis is on how even a standardized first-order valuation can already change the conversation between public and private actors. To make case studies comparable and to avoid endless methodological debates, this study applies a TEV assessment as a standardized minimum level of granularity. TEV captures the monetary value of a bundle of ES, grouped into provisioning services (e.g. food, raw materials), regulating services (e.g. climate regulation, flood mitigation, water purification, pollination), habitat services (e.g. nursery service, biodiversity protection), and cultural services (e.g. recreation, aesthetic value, existence and bequest values, cognitive development).

For each case, TEV is calculated for two land-use scenarios: the BAU current or pre-intervention situation, and the NbS scenario, representing the land-use configuration under the NbS intervention. This TEV comparison highlights how NbS shifts the composition and magnitude of ES flows, and who is most likely to benefit from these shifts. Detailed methodological steps (land cover classification, ESVD matching, statistical treatment, outlier removal, discounting assumptions, and detailed ES lists) are provided in **Annex B**.

The selection of case studies was driven by both substantive ambition and practical feasibility. During the scoping phase, it became clear that case selection was constrained by a set of structural conditions that reflect the current state of market readiness for NbS valuation. These were emergent filters that significantly narrowed the pool of viable cases. In practice, cases needed to meet several minimum conditions:

- availability of sufficiently granular land-use and spatial data compatible with the ESVD framework.
- clarity regarding the intervention type and counterfactual (BAU) scenario.
- defined project boundaries and area size.
- transparency regarding financing structure and timeline.
- willingness of project partners to share data and assumptions.

The fact that relatively few NbS projects currently meet these conditions is in itself an important finding. It suggests that, while interest in NbS is growing, systematic valuation practices are not yet embedded in mainstream project development or finance workflows. Data fragmentation, inconsistent ES classifications, limited documentation of baseline conditions, and institutional caution regarding reputational risk all restrict the immediate applicability of standardized TEV assessments.

Within these constraints, two cases were selected that provided sufficient robustness and diversity to illustrate the valuation logic:

> **Avon Needs Trees**: A Triodos-financed reforestation initiative in the UK. Selected as a landscape-scale NbS with measurable impacts across carbon sequestration, biodiversity, water regulation, cultural services, and restoration objectives, and with a blended finance structure relevant to PPP design.
>
> **El Roble Farm**: A regenerative orchard transition in Spain, previously developed under Make Nature Count and updated here. Selected because it demonstrates how agricultural NbS can generate multiple ecosystem-service flows across private and public stakeholders; farmers, financiers, communities, and public authorities, particularly under climate stress.

Together, these cases illustrate not only how ESV can reveal differentiated value profiles relevant for private investment and public policy, but also how current data and institutional constraints shape what is currently feasible in NbS valuation practice.

Case Study 1 - Avon Needs Trees, Lower Chew Valley (United Kingdom)

Type of NbS and landscape context

Since its founding in 2019, Avon Needs Trees has focused on creating new areas of woodland to benefit both nature and people. What started as individual reforestation projects has evolved into a landscape-scale initiative in the Lower Chew Valley, with a current partnership area of around 784 hectares. Through the United Kingdom Landscape Recovery Scheme, the project shifts from farm-by-farm interventions to a long-term, multi-actor landscape approach. Planting new woodlands, as part of a mosaic of habitats in line with local nature recovery strategy, is essential to tackling the climate and related nature emergencies. Avon Needs Trees is doing so by fundraising to buy land to plant new, permanent woodlands of well cared-for trees that will store up carbon over time. New woodlands help natural flood management as well as helping local nature to bounce back. Key NbS elements include: the development of new woodlands to store carbon and provide habitat alongside the protection of existing forests and their carbon stocks, species-rich grasslands to enhance soil health, river and wetland restoration to store water and reduce downstream flooding, and the expansion of wildlife corridors to connect fragmented habitats, climate-resilient food production trials, and a heritage trail and public access initiatives to strengthen cultural connection.

Avon Needs Trees finances large-scale woodland creation through a "blended finance" model, combining public grants (like Defra's), private loans (e.g., Triodos Bank), Biodiversity Net Gain (BNG) credits, corporate giving, crowdfunding, and community donations to buy land and restore habitats, using the

future sale of ecological units (like BNG credits) to repay loans. The initiative is therefore financed through a blend of public and private capital: government funding via Landscape Recovery (long-term, 20-year horizon), philanthropy and grants, and co-financing by Triodos Bank through its UK business lending activities.

Key ESV findings

Economic Benefits per Land Use (pre- and post- NbS) in the Lower Chew Valley, UK (Int $/year)			
Ecosystem Service	*UK0 Intensive Land Use (n = 90)*	*UK1 Forest & Woodland (n = 413)*	*Comparable Difference*
Provisioning	***$ 505,400***	***$ 556,000***	***-$ 502,100***
1. Food	$ 2,900	$ 3,300	$ 400
2. Water	-	$ 552,700	-
3. Raw Materials	$ 502,500	$ 0,0	-$ 502,500
4. Genetic Resources	-	-	-
5. Medicinal Resources	-	-	-
6. Ornamental Resources	-	-	-
Regulating	***$ 410,300***	***$ 7,726,900***	***$ 1,486, 800***
7. Air quality regulation	$ 7,500	$ 1,068,100	$ 1,060,600
8. Climate regulation	$ 5,800	$ 452,000	$ 446,200
9. Moderation of extreme events	$ 12,900	$ 40,300	$ 27,400
10. Regulation of water flows	$ 10,500	$ 116,600	$ 106,100
11. Waste Treatment	-	$ 91,800	-
12. Erosion Prevention	-	$ 129,800	-
13. Maintenance of soil fertility	$ 5,200	$ 185,900	$ 180,700
14. Pollination	-	$ 5,608,100	-
15. Biological control	$ 368,400	$ 34,300	-$ 334,100
Habitat	***$ 200,300***	***$ 300,500***	***$ 101,800***
16. Maintenance of Life Cycles	$ 1,600	-	-
17. Maintenance of Genetic Diversity	$ 198,700	$ 300,500	$ 101,800
Cultural	***$ 1,979, 800***	***$ 2,577,100***	***$ 750,300***
18. Aesthetic Information	$ 722,500	-	-
19. Opportunities for recreation and tourism	-	$ 569,500	-
20. Inspiration for culture, art and design	$ 15,200	$ 35,400	$ 20,200
21. Spiritual Experience	-	-	-
22. Information for cognitive development	$ 48,700	$ 141,400	$ 92,700
23. Existence, bequest values	$ 1,193,400	$ 1,830,800	$ 637,400
Total	**$ 3,095,800**	**$ 11,160,500**	**$ 1,836,800**

Figure 3. *TEV of ES by category in the Lower Chew Valley, UK, expressed in international dollars per year (rounded to the nearest hundred dollars). Stacked bars show the contribution of provisioning, regulating, habitat, and cultural services to the overall TEV. Separate bars represent pre- and post-NbS land uses: intensive systems (UK0) and forest and woodland systems (UK1) respectively.*

The TEV comparison between intensive land use (UK0) and the woodland-based NbS configuration (UK1) reveals a clear structural shift in the composition and magnitude of ecosystem-service flows (**Figures 3 and 4**). Under the woodland scenario (UK1), total annual ES value more than doubles relative to the intensive baseline. This increase is driven by a broad rebalancing of the ES portfolio. In particular:

1. Climate regulation increases substantially due to long-term carbon sequestration in biomass and soils.
2. Air quality regulation and pollination services increase as habitat diversity expands.
3. Water regulation and flood mitigation functions improve through enhanced infiltration, retention and wetland restoration.
4. Existence and bequest values, along with recreation and aesthetic services, increase significantly as access, landscape quality and biodiversity improve.

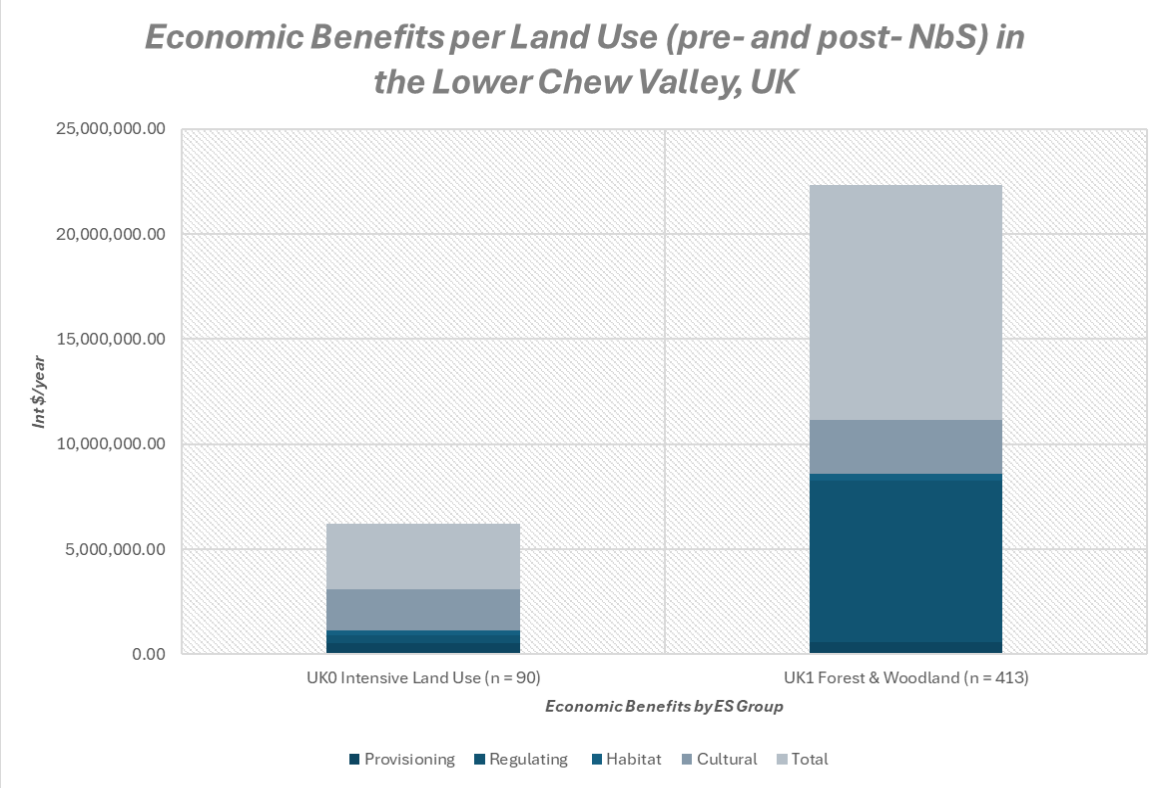

Figure 4. *Economic benefits of ES before and after implementation of NbS in the Lower Chew Valley, UK. The table presents the annual economic values (Int $/year) of ES under intensive*

Importantly, the woodland transition does not simply replace provisioning services with regulating services. Rather, it reconfigures land use from narrowly focused output production toward multifunctionality. While certain intensive provisioning flows decline (e.g. high-input agricultural production), they are partially replaced by diversified land uses, including climate-resilient production trials and nature-based enterprises. The overall effect is a redistribution of value across service categories and time horizons.

A critical insight from this case is that many of the largest value increases arise in services that are spatially distributed and temporally extended. Flood mitigation benefits accrue downstream; climate regulation benefits are global; cultural services are experienced locally but valued across generations. These value flows are real and economically significant, yet they are not automatically captured by the landowner or project developer under existing market conditions.

This does not mean that regulating services are "purely public" or inherently unsuitable for private finance. Rather, it highlights a structural mismatch between where ecosystem-service value is generated and where financial capture mechanisms currently exist. The TEV results therefore make visible not only the increase in total value, but also the distributional pattern of benefits across stakeholders, sectors and scales.

From a valuation perspective, the Avon Needs Trees case demonstrates that woodland-based NbS can generate a high-magnitude, diversified bundle of ecosystem-service flows. From a governance and finance perspective, it raises the next-order question: how can financial structures evolve to recognize and align with this broader value creation profile? That question is taken up in Chapter 3.

Case Study 2 - El Roble Farm, Murcia (Spain)

Type of NbS and landscape context

El Roble is a ~300 ha farm in Murcia, Spain, within a Meso-Mediterranean climate characterized by low rainfall and high torrential events. Historically, conventional agriculture (rainfed almonds, olives, peaches, apricots, wheat) and partly degraded natural areas led to reduced biodiversity and increased vulnerability to drought. Through investment by SLM Partners' Silva Europe Fund, supported by the ASN Biodiversity Fund, El Roble is transitioning towards 100% organic and regenerative agriculture, by including a new crop mix (rainfed and irrigated almonds, pistachios, olives), restoration of degraded natural areas, hedgerows and biodiversity hotspots bordering plots to boost habitat and pollination, and soil management practices that enhance water retention and soil organic matter. In February 2022, SLM Silva Europe Fund completed the acquisition of its first property in the southeast of Spain, near Murcia. In contrast to Avon Needs Trees, El Roble is primarily financed as a private investment with long-term land stewardship, and return

expectations combining financial performance (yields, land value) with ecological outcomes (biodiversity, soil health, resilience).

Key findings

Economic Benefits per Land Use (pre- and post- NbS) in El Roble farm, SP (Int $/year)			
Ecosystem Service	*SP0 Conventional Agriculture*	*SP1 Organic Agriculture*	*Difference*
Provisioning	***$ 1,294,100***	***$ 2,095,200***	***$ 801,100***
1. Food	$ 1,294,100	$ 2,095,200	$ 801,100
2. Water	-	-	
3. Raw Materials			
4. Genetic Resources	-	-	
5. Medicinal Resources	-	-	
6. Ornamental Resources	-	-	
Regulating	***$460,200***	***$913,100***	***$442,900***
7. Air quality regulation	$ 66,000	$ 131,200	$ 55,200
8. Climate regulation	$ 357,600	$ 496,100	$ 138,500
9. Moderation of extreme events	-	-	
10. Regulation of water flows	-	-	
11. Waste Treatment	-	-	
12. Erosion Prevention	$ 600	$ 1,200	$ 600
13. Maintenance of soil fertility	-	$ 28,200	$ 28,200
14. Pollination	$ 36,000	$ 244,000	$ 208,000
15. Biological control	-	$ 12,400	$ 12,400
Habitat	**-**	**-**	**-**
16. Maintenance of Life Cycles	-	-	
17. Maintenance of Genetic Diversity	-	-	
Cultural	***$5,600***	***$25,800***	***$20,200***
18. Aesthetic Information	-	-	
19. Opportunities for recreation and tourism	$ 5,400	$ 10,700	$ 5,300
20. Inspiration for culture, art and design	-	-	
21. Spiritual Experience	-	-	
22. Information for cognitive development	-	$ 14,800	$ 14,800
23. Existence, bequest values	$ 200	$ 300	$ 100
Total	***$1,759,829***	***$3,034,193***	***$1,264,364***

Figure 5. *Economic benefits of ES under conventional (SP0) and organic (SP1) agricultural management at El Roble Farm, Murcia, Spain. This table reports annual ES values (Int $/year) for provisioning, regulating, habitat, and cultural categories (TEEB) (rounded to the nearest hundred dollars).*

The TEV comparison between conventional agricultural management (SP0) and regenerative organic management (SP1) at El Roble Farm reveals a clear transformation in both the magnitude and composition of ecosystem-service flows (Figures 5 and 6).

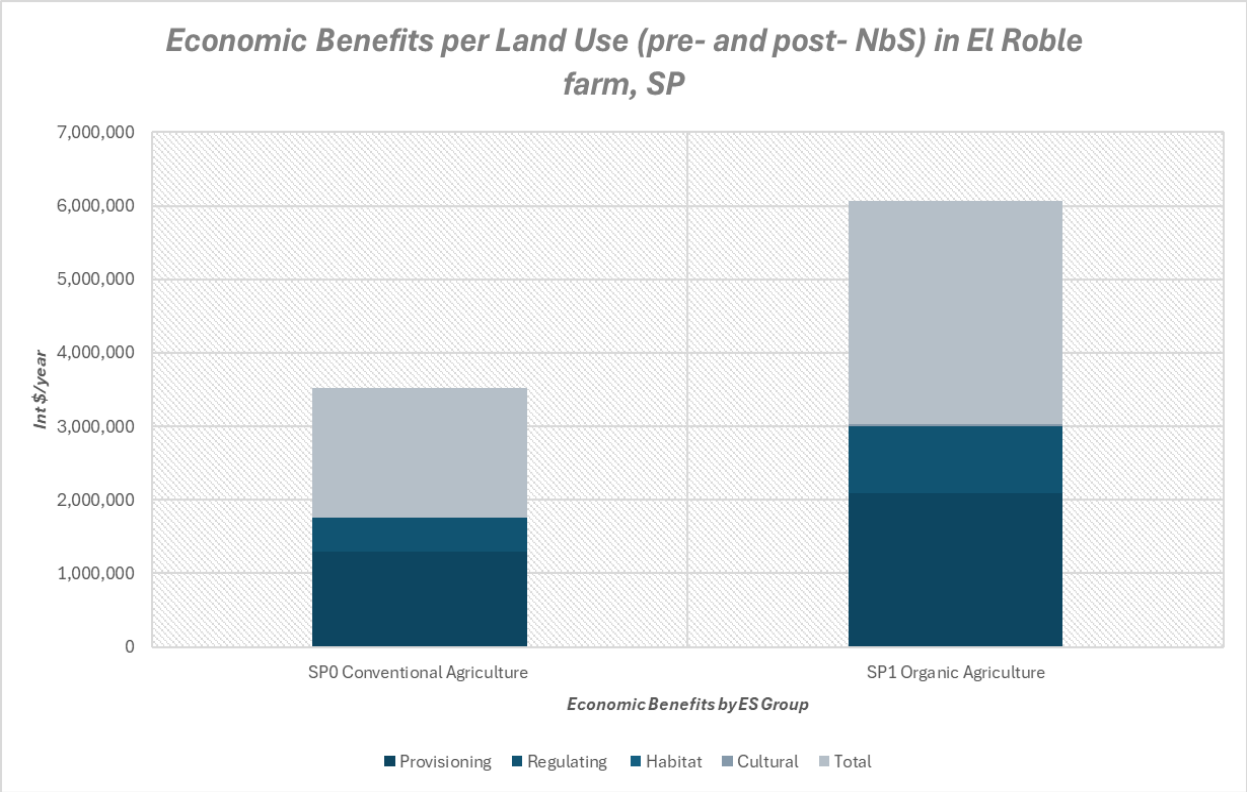

Figure 6. *TEV of ES by category for El Roble Farm, Murcia, Spain, expressed in int/$/ per year. Stacked bars show the contribution of provisioning, regulating, habitat, and cultural services to the overall TEV. Separate bars represent pre- and post-NbS land uses: conventional systems (SP0) versus organic systems (SP1).*

Unlike the woodland case of Avon needs trees, where value shifts primarily toward regulating and cultural services, El Roble demonstrates that regenerative agriculture can simultaneously enhance provisioning, regulating and cultural services within a productive landscape. The main findings can be summarized as follows:

1. **Provisioning value increases under regenerative management.**
   Under SP1, food production becomes more diversified and more resilient. The introduction of mixed perennial crops (almonds, pistachios, olives) and improved soil management enhance

productive capacity while reducing vulnerability to climate stress. Unlike conventional systems that rely heavily on external inputs and monoculture exposure, regenerative management supports more stable long-term yield potential. This challenges the assumption that ecological improvement necessarily reduces agricultural output.

2. **Regulating services increase substantially and strengthen resilience.**
   The most structurally important gains occur in regulating services, particularly climate regulation (carbon sequestration in soils and biomass), pollination, soil fertility, and water regulation. Hedgerows, biodiversity hotspots and soil organic matter improvements enhance ecosystem functionality across the farm. These services reduce drought vulnerability, buffer torrential rainfall impacts, and lower long-term production risk. The valuation makes it visible how regenerative practices convert ecological restoration into economically meaningful resilience.

3. **Cultural services become part of the value profile.**
   Although smaller in absolute terms than in the UK woodland case, CES, such as recreation, knowledge development, landscape identity and existence values, also increase under SP1. These services reflect the shift from extractive land use toward stewardship-oriented land management. Their inclusion broadens the understanding of what a productive farm landscape delivers beyond commodity output.

4. **Total value increases significantly, with spillovers beyond the farm boundary.**
   Overall, the regenerative scenario (SP1) generates a net annual economic gain of over Int $1.26 million compared to conventional agriculture (SP0). A substantial share of this gain arises from regulating and cultural services whose benefits extend beyond the farm itself, to downstream water users, neighboring landowners, regional biodiversity networks and society at large. The TEV results therefore reveal not only increased productivity, but a rebalancing of value across stakeholders and scales.

Taken in its entirety, this case demonstrate that agricultural NbS are not merely compensatory measures or environmental add-ons. When designed systemically, they can enhance productive capacity, strengthen climate resilience and generate broader socio-economic value. ESV makes this multifunctionality visible and comparable, offering a more complete basis for evaluating long-term land stewardship strategies.

Joint Case Studies Discussion

Across both the Lower Chew Valley and El Roble Farm, the TEV results reveal a consistent structural pattern: the largest value increases occur in regulating and CES, such as climate regulation, water management, pollination, soil retention, recreation, existence and bequest values. These services generate benefits that are widely distributed across actors and scales. While they are not always directly monetized by landowners or project developers, they clearly benefit municipalities, downstream businesses, insurers, agricultural producers, regional economies, and society at large.

The key issue is that the value of these services is only partially captured under existing market and accounting structures. This creates a structural misalignment between where value is generated and where financial returns accrue. Private actors often benefit indirectly through reduced risk, greater asset stability, improved supply chain resilience, or enhanced land value, yet these benefits are rarely made explicit in conventional investment appraisal.

El Roble further demonstrates that ecological restoration does not necessarily imply a trade-off with production. Regenerative management can increase provisioning value while strengthening regulating and cultural services, supporting more resilient yields and reducing long-term input dependency and climate exposure. This insight is particularly relevant for financial institutions assessing portfolio quality under climate stress: NbS can function not only as impact investments, but as risk-management strategies.

Finally, both cases underscore the structural importance of CES. In the UK case, CES account for a substantial share of total gains; in Spain, they contribute meaningfully alongside productive and regulating functions. These services connect directly to dimensions of Brede Welvaart (health, social cohesion, place identity, and intergenerational justice) and strongly influence societal support for interventions. By monetizing CES carefully and transparently, ESV does not claim to “price everything.” Rather, it ensures that these dimensions enter the same analytical space as conventional financial metrics.

Together, the case studies demonstrate that NbS generate multi-layered value profiles that cut across public and private domains. Ecosystem Service Valuation (ESV) makes these profiles visible, comparable and discussable. The next chapter builds on this insight to explore how such value patterns can inform the design of public–private partnerships, specifically through the alignment of capital stacks, value recognition and governance structures.

Chapter 4: The Potential for Public-Private Partnerships

"Good growth requires getting public–private partnerships right. An industrial strategy for the twenty-first century should be oriented around key missions, not specific sectors."

- Mariana Mazzucato (Mazzucato, 2024)

The case studies presented in Chapter 3 reveal a structural pattern that goes beyond individual projects. NbS generate multi-layered value: regulating stability, cultural legitimacy, landscape resilience, risk reduction and long-term productivity. The costs of implementing NbS are often concentrated in a limited number of actors (landowners, developers, municipalities, or early-stage investors) while the benefits are widely distributed across society, value chains and future generations. This structural asymmetry is a system design issue. Conventional financial and accounting frameworks are built to recognize revenue streams and private returns but not distributed ES flows. As a result, NbS frequently appear financially marginal, even when they generate substantial societal and economic value. Public-Private cooperation becomes relevant precisely at this interface. Not merely as co-financing arrangements, but as governance structures that align distributed benefits with concentrated investment responsibilities. When properly designed, PPPs can redistribute risk across actors and time horizons, recognise shared ecosystem dependencies, and structure financial flows in line with actual value creation.

PPPs should not simply de-risk private capital but co-create public value (Mazzucato, 2024). Assets are not static. They generate flows of value over time, but only if they are maintained and, when necessary, restored or enhanced. Roads, energy grids, buildings and water systems all follow this principle. They require predictable annual budgets to preserve functionality, and they require upfront capital investment when they are built, expanded or upgraded. The same logic applies to NC. Forests, wetlands, soils and river systems generate ES flows (flood protection, pollination, water regulation, climate stability, cultural benefits) but these flows depend on the condition of the underlying stocks. When the stock degrades, the flow declines. When the stock is restored, the flow can increase in both magnitude and reliability.

This perspective leads directly to two complementary financial responsibilities: First, ecosystems require ongoing OPEX. Maintaining soil quality, managing forests, monitoring wetlands, restoring river dynamics; these are recurring costs necessary to preserve the NC stocks that generate ES. When nature is framed as infrastructure, it becomes possible for municipalities, water boards and companies to embed these maintenance costs structurally into budgets, rather than relying on short-term subsidies or ad hoc project funding. Second, landscape restoration and large-scale NbS require CAPEX. Transitioning agricultural systems, reforesting degraded land, redesigning catchments or creating green–blue infrastructure requires upfront investment. When NC is treated as an asset that enhances future service flows — such

as reduced flood damage, improved water security, increased yield resilience or lower climate risk — restoration becomes economically comparable to other long-duration infrastructure investments.

Asset thinking therefore transforms the debate. It shifts the question from "How do we subsidize environmental projects?" to "How do we finance, maintain and govern essential natural infrastructure?" PPPs become relevant precisely at this point. They are the institutional arrangements through which OPEX and CAPEX responsibilities for NC can be allocated, shared and structured over time.

"It is important for FfB that NbS can be presented as part of mainstream economic models, generating benefits in terms of returns, resilience, and risk management. They should be considered by companies and financial institutions in decision-making and economic analysis as a source of stability and key tools for sustainability; to advance practices from reducing pressures to effectively generating biodiversity gains towards nature-positive goals."

- *Julen Gonzalez, Finance for Biodiversity Foundation*

This intuition captures a key shift in thinking. If nature is an asset that generates economic value, its use and degradation should be reflected in financial flows. Yet today, ES benefits remain only partially represented in financial markets (Hudson et al., 2023). Payment for Ecosystem Services (PES) schemes, carbon and biodiversity credits, outcome-based finance, insurance products, environmental taxes and product premiums attempt to address this gap (GFI, 2024; Tam et al., 2025). However, these instruments raise fundamental questions: who benefits, who pays, and under which ecological boundaries? Pure trading logic alone is insufficient. Nature credit markets may allow investors to "go long" on restoration, but without robust baselines and regulatory caps they may also create perverse incentives or detach financial instruments from ecological realities. The issue is therefore not whether markets should exist, but how they are embedded within policy and governance frameworks.

At present, most NbS still rely heavily on public funding; only around 3% receive substantial private finance (EIB, 2023). This is not only due to a lack of financial engineering, as blended finance structures are also technically well understood. Rather, the challenge lies in aligning financial design with real ecological performance and distributed value creation.

The Specific Role of ES Valuation in Designing PPPs

PPP is the institutional architecture through which public mandates, private investment logic and scientific evidence are aligned. ESV functions as the common language within that architecture. It allows ecological and socio-economic trade-offs to be discussed in comparable terms, making it visible where current arrangements are inequitable or inefficient. This, in turn, supports the design of capital layering, governance adjustments and policy reform. In this way, blended finance becomes one component of a broader mission-oriented partnership structure.

PPP Design Dimensions

ESV provides a shared evidence base. By making ES flows visible and comparable, ESV reveals where value is created, for whom, at what magnitude, and over which time horizon. This clarity helps to develop effective PPPs; it makes misalignments discussable, supports decisions about when, either public or private, co-financing is justified, and clarifies which ES gains support private balance sheets and which primarily serve public mandates.

Considering the Avon Needs Trees and El Roble cases, a structural insight emerges: most NbS benefits diffuse widely across actors and scales, while implementation costs are concentrated. PPPs informed by ES valuation can move beyond a narrow, reactive focus on merely "financial de-risking" individual projects. ES valuation informs three core design dimensions of a PPP, which, together, offer a practical framework for designing PPPs that are ecologically grounded, financially coherent and socially legitimate:

Capital design: Who pays and how?
ESV clarifies which ES generate private returns, which create widely distributed benefits, and where and at what stage, which mechanisms of co-financing are needed and justified. This supports the structuring of (extended) blended finance arrangements that align capital contributions with value distribution.

Value recognition: Who benefits and how is that recognized?
ESV expands conventional financial materiality analysis by incorporating regulating and cultural services that show socio-economic effects which highly influence financial variables like risk exposure, asset quality, social license and long-term stability. This helps move beyond narrow shareholder ROI towards a broader understanding of value creation and value at risk analysis.

Governance alignment: What enabling conditions are needed?
By identifying ES gains and losses across stakeholders, ESV supports discussions about subsidy reform, procurement design, regulatory alignment and landscape coordination. It helps clarify where policy intervention is required to align incentives with ecological boundaries.

"The first move I would make is to stocks, because then we can talk about asset management. We ought to be measuring the wealth of nations, not the GDP of nations… maybe we ought to start thinking about creating an institution which can charge for it and then use it for protecting mother nature."

- *Partha Dasgupta, Building Bridges 2025 (Capital flows for the future)*

PPP Design Groups

In the context of NbS, blended finance is not primarily a technical structuring exercise, but a response to a structural imbalance: the uneven distribution of benefits and burdens revealed by ES valuation. The Avon Needs Trees and El Roble cases illustrate this clearly. In both cases, a relatively modest share of the TEV is directly monetized by the primary investor (through provisioning services such as farm income or specific revenues). A far larger share accrues through regulation and cultural services: flood mitigation, pollination, climate regulation, soil stability, recreation, and existence values. These benefits diffuse across municipalities, supply chains, insurers, households and future generations. Without valuation, this diffusion remains invisible. With ESV, it becomes measurable. Blended finance, in this context, becomes the mechanism through which those who benefit can contribute to those who invest.

In the Lower Chew Valley, where woodland restoration generates substantial public risk reduction and climate benefits, public and philanthropic capital are logically justified as anchor investors as co-financiers of infrastructure-like services. In El Roble, where regenerative agriculture strengthens both private yields and broader ecosystem resilience, private impact capital can play a stronger role, supported by enabling public frameworks. This capital becomes particularly relevant where NbS function as a form of insurance: stabilizing long-term production systems, reducing exposure to drought or flood risk, and lowering systemic volatility rather than delivering short-term profit spikes.

However, expert interviews also consistently underline that public capital should not merely "de-risk" private investors. When public actors enter too late (only after a financial gap is identified) their role becomes reactive. ESV shifts this dynamic. By quantifying ES gains early in project development, public and private actors can jointly define which NC stocks are being maintained or restored, which ES are prioritized, and how benefits and risks are distributed over time.

Blended finance then becomes a co-design process rather than a financial patch. This shift has implications for those who must be involved from the outset. Scaling NbS through PPPs requires early involvement of actors beyond the immediate project developer and financier. When actors are only brought together at the financing stage, PPPs tend to become transactional. When they are involved during the design phase,

particularly through an early-stage ES assessment, PPPs can become mission-oriented collaborations grounded in shared understanding of landscape-level trade-offs. Based on the case studies and interviews, at least five design groups need to be structurally involved in early-stage NbS investment design:

Land stewards and project developers
Farmers, landowners, water boards, infrastructure agencies and restoration organizations hold operational knowledge and bear initial implementation risks. Their understanding of local ecological dynamics is essential for realistic valuation and design.

Public authorities across sectors
Environmental ministries, but also finance, infrastructure, agriculture and spatial planning authorities. Many ES benefits like flood risk reduction, water security, and soil stability, sit across departmental mandates. Without cross-ministerial coordination, public benefits remain fragmented and under-financed.

Financial institutions
Commercial banks, impact funds, pension funds and insurers must be engaged early, not only to assess risk, but to articulate how ES gains translate into portfolio stability, asset quality and long-term return expectations.

Knowledge institutions and data providers
Universities, research consortia, ESVD, national statistical offices (CBS), and actors involved in SEEA and TNFD implementation provide the methodological grounding needed to avoid inflated or inconsistent claims. Their early involvement reduces greenwashing risks and increases credibility.

Local communities and affected stakeholders
CES like sense of place, identity, and access to landscape, influence project legitimacy and long-term durability. Without early stakeholder engagement, projects risk resistance even when financially sound.

PPP Design Insights

There is a difference between funding and financing. *Funding* refers to who ultimately pays or bears the cost of restoration or maintenance. *Financing* refers to the financial structure that mobilizes and intermediates funding (loans, equity, guarantees, outcome payments, taxes, user fees, etc.). The actor who finances is not always the actor who funds. For example, a bank may provide upfront capital

(financing), while municipalities or water users ultimately repay through taxes or tariffs (funding). The table below illustrates how different ES imply different beneficiary groups, funding logics and suitable financing structures.

Table 1: *Overview: ES, Beneficiaries and Suitable Financial Structures for PPP Design*

ECOSYSTEM SERVICES	Flood mitigation & water regulation	Climate regulation (C sequestration / avoided emissions)	Soil fertility & yield stability	Pollination services	Biodiversity & habitat services	Recreation & cultural services	Air quality regulation	Erosion control & soil retention
TYPICAL BENEFITIARIES	Municipalities, water boards, infrastructure agencies, insurers, downstream businesses, households	National governments, regulated emitters, global society, future generations	Farmers, agri-food companies, supply-chain actors, insurers	Farmers, agri-food companies, regional agricultural systems	Society at large, conservation agencies, tourism sector, future generations	Local communities, municipalities, tourism sector	Urban residents, health systems, municipalities	Farmers, infrastructure owners, water boards
WHO ULTIMATELY FUNDS? (FUNDING)	Municipalities, water boards, regional/ national governments, insurers	Governments (climate budgets), regulated companies	Farmers, supply-chain buyers, agri-cooperatives	Farmers, agri-environment schemes, regional authorities	Governments, conservation funds, philanthropic actors	Municipalities, local taxpayers, tourism operators	Municipalities, public health budgets	Farmers, infrastructure owners, water boards
SUITABLE FINANCING MECHANISMS	Public co-financing, resilience bonds, green infrastructure funds, water tariffs, climate adaptation funds	Carbon contracts, climate funds, long-term offtake agreements, public grants, blended climate finance	Impact equity, concessional loans, regenerative agriculture funds, supply-chain pre-financing, blended agri-finance	Stewardship contracts, agri-environment payments, landscape-level cooperation funds	Conservation funds, biodiversity credits (within regulatory caps), grants, blended public–private funds	Municipal budgets, tourism levies, user fees, blended local funds	Public investment, green bonds, health-linked finance instruments	Blended land stewardship funds, infrastructure protection budgets
ACTORS TO INVOLVE EARLY IN PPP DESIGN	Water boards, municipalities, infrastructure agencies, insurers, long-term investors	Climate ministries, carbon buyers, institutional investors	Farmers, agri-cooperatives, food companies, agricultural banks, insurers	Farmers, regional governments, agricultural cooperatives	Environmental ministries, conservation NGOs, regional authorities, philanthropic investors	Municipalities, community organizations, tourism operators	Municipalities, health authorities, urban planners	Farmers, infrastructure agencies, regional authorities

This overview demonstrates three important design insights:

Different ES imply different funding logics.

Not all services are best supported by the same financial mechanism. Flood protection aligns

naturally with public infrastructure budgets; soil fertility aligns with agricultural finance; recreation aligns with municipal or tourism revenue streams.

Multiple services imply multiple beneficiaries.
Most NbS generate a bundle of services. PPP design should therefore reflect this multiplicity, rather than seeking a single funding source.

Magnitude indicates weight, not price.
ESV helps identify which services are dominant in a landscape and therefore which actors have proportionally larger stakes. It guides proportional involvement.

What this means is that early-stage ES assessment should precede capital structuring. Once the service bundle and beneficiaries are identified, PPP discussions can shift from “who can fill the gap?” to “who benefits from which service, and how should contributions be structured accordingly?”. Scaling NbS requires moving from generic blended finance concepts to landscape-specific role allocation. ESV provides the analytical foundation for this shift. It clarifies not only that everyone has a role to play, but what kind of role and in which phase of restoration and maintenance. That clarity is the precondition for PPPs that are not only financially viable, but proportionate, legitimate and durable.

Chapter 5: Conclusions and Recommendations

Throughout this report, one structural insight consistently emerges: NbS generate multiple forms of value across actors, sectors and scales. Yet those who invest are not always those who benefit most. This misalignment between value creation and financial responsibility is one of the core explanations why many NbS struggle to scale, despite their strong societal case. ESV has proven to be a first important step to help correct this imbalance. By clarifying which ES are generated, who benefits from them, and at what magnitude, ESV makes the distribution of benefits and burdens that underpin every NbS visible. Which should be the starting point of every design process, either technically or financially.

ESV reveals that NbS generate different types of services, at different scales, for different beneficiaries. As shown throughout this report, the mix of ES differs per landscape. Understanding the ES profile of a landscape therefore does more than just quantify value. It points toward the actors who benefit, and therefore toward the actors who logically need to be involved in partnership design.

In that sense, scaling NbS is not only a financial challenge, but maybe even more a coordination challenge. For PPPs, ESV provides the analytical basis to make financial allocation transparent and proportionate. It reveals who benefits, how much, and from which services, and therefore who logically has a role to play.

Throughout this report we found a great variety of insights, for different stakeholder groups and different implementation levels. However, all of them delivered a meaningful contribution towards the aim of scaling up NbS. It is therefore recommended to look into different chapters and familiarize once self with how ESV plays a role throughout this transition of scaling up.

Yet, to summarize the main insights of this report, the following **Table 2** presents the core conclusions alongside actionable recommendations for improving the evaluation, financing, and implementation of NbS through ESV.

We hope that this report with it`s conclusions and recommendation can serve as an overview and guiding light for next steps.

Table 2. *Core conclusions and recommendations for advancing NbS through ESV.*

Core Conclusions	Core Recommendation
NbS deliver broad, cross-boundary benefits that are often undervalued compared to conventional solutions.	Incorporate full societal value assessments to properly reflect distributed and long-term benefits in decision-making.

Progress depends more on consistent application than on creating new definitions of NbS.	Develop and adopt standardized, operational guidelines for NbS across sectors and contexts.
Conventional financial appraisals systematically underrepresent the full benefits of NbS.	Integrate ESV into cost–benefit analyses to capture non-monetized benefits.
Excluding ES creates a structural bias favoring conventional solutions.	Use ESV to make NbS benefits visible and enable fair comparison with grey infrastructure.
Efficiency-focused frameworks overlook many important ES and distort decision-making.	Evaluate the full bundle of ES to capture trade-offs comprehensively.
Monetary valuation is a useful tool, but not a substitute for broader ecological and social judgement.	Use monetary valuation early to inform decisions while complementing it with qualitative assessments.
Early valuation can significantly influence how stakeholders perceive and discuss NbS.	Apply ES assessments at early project stages to guide better design choices.
ESV is not yet widely integrated into mainstream practice.	Address data gaps, standardization, and institutional barriers to enable broader adoption.
ESV is valuable but constrained by current data availability and institutional limitations.	Invest in data infrastructure and institutional frameworks to expand feasible valuation practices.
NbS fundamentally shift the structure and distribution of ecosystem-service flows.	Use TEV analyses to understand systemic changes, not just aggregate value differences.
NbS enhance multifunctionality and redistribute value across services, actors, and time.	Develop financial and policy mechanisms that align value capture with distributed benefits.
Regenerative agriculture increases total value while enhancing multiple ES.	Promote regenerative practices as a strategy for resilient and multifunctional land use.
NbS suffer from a mismatch between concentrated costs and widely distributed benefits.	Design financial mechanisms that redistribute benefits to those who bear the costs.
ESV provides a foundation for aligning capital, value recognition, and governance in PPPs.	Use ESV to structure PPPs around capital design, benefit recognition, and governance alignment.
Most NbS value is hidden without proper valuation, despite being widely distributed.	Use early valuation to inform blended finance structures and ensure fair contribution from beneficiaries.
Different ES require different funding approaches aligned with their beneficiaries.	Match funding structures to service types and beneficiary groups before structuring capital.
NbS scale is constrained by misalignment between investors and beneficiaries.	Address coordination challenges by aligning incentives, roles, and value distribution among stakeholders.

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Annex A - Expert Interview Template

Nature-based Solutions (NbS) and Ecosystem Service Valuation (ESV)

(All interview questions for general perspective and alignment are shown in red Italics)

Before we begin, I'd like to go over some formalities to make sure you are comfortable and understand the process of this interview. This interview will be conducted via Microsoft Teams and may be recorded for transcription and research purposes. Your participation is voluntary, and you may decline to answer any question or withdraw from the interview at any time without any negative consequences. The insights you provide will be used to inform research on Nature-based Solutions (NbS) and Ecosystem Service Valuation (ESV), and may contribute to case studies, policy recommendations, and guidance for public-private partnership initiatives.

Do you have any questions about the purpose of this interview or how the data will be used before we proceed?

In that case I'd like to confirm your consent to participate in this recorded interview.

Please feel free to pause or stop me at any time if you feel the need to.

(Minute 5)

Interview Objective:

The project this interview is a part of was commissioned by the Dutch Ministry of Agriculture, Nature and Food Quality to demonstrate how ESV can play a pivotal role in mainstreaming and scaling up NbS. Previous work with the Ministry of LVVN has found that quantifying Total Economic Value (TEV) and impacts on different scenarios of ES fits well with the concept of NbS, specifically in making the application of ESV less abstract. Stakeholder consultations carried out in this previous project revealed a disconnect between the abstract nature of ES value estimates and their practical application, calling for the translation of these abstract estimates into more relatable terms.

During this interview we aim to explore how ESV and corresponding metrics can help mainstream and scale NbS, generate compelling case studies for public and private decision-makers, inform actionable recommendations for policymakers, financiers, and insurers, and support public-private partnership (PPP) initiatives. We want to capture both knowledge and network perspectives to understand how NbS and ES valuation can find each other in practice.

This interview will be semi-structured, so we may probe on topics that are particularly relevant to your work. You are always welcome to provide examples, case studies, or data that illustrate your points.

Estimated Duration: 60 minutes

Background and Expertise

Focus: Contextualize the expert's experience and perspective.

1. *Could you briefly describe your current role and experience with Nature-based Solutions (NbS), ecosystem services valuation (ESV), and/or natural capital accounting (NCA)?*
    a. *and what distinctions, if any, do you see between ESV and NCA in your place of work? E.g. different use cases between ESV as flows and NCA as stocks.*
2. *Which sectors or geographies have you primarily worked in regarding NbS?*
3. *How has this experience shaped your view on the economic and ecological benefits of NbS?*

Section 1: Conceptual Introductions

Focus: Explore the expert's understanding of NbS, ecosystem service valuation, and natural capital accounting, and how these concepts can support mainstreaming, scaling, and financing NbS.

1. *How can ESV make the benefits of NbS visible and tangible to policymakers, investors, and businesses, particularly when traditional markets undervalue these services?*
2. *What are the main challenges and barriers in valuing NbS across sectors?*
    a. *And what would need to change in order to overcome these barriers?*

Section 2: Current State of NbS & Use of ESV

Focus: To demonstrate ESV's current role in financing, risk management, and scaling NbS.

We categorize and investigate the applications of ESV in 4 main requirements of NbS: **(A)** cost -efficiency must be demonstrated, **(B)** social value must be clear as a license to operate, **(C)** ecological-financial risks must be mitigated, and **(D)** revenue streams should be reliable. In addressing these in this interview, we present 4 sections, with corresponding interview questions:

1. **Sourcing Public Funding and Private Financing (The Sales Challenge)**
2. **Due-diligence**
3. **Mitigation Hierarchies**

a. *What are the most effective strategies for mobilizing public funding and private finance between and within revenue streams (using mechanisms like PES, carbon/biodiversity credits) and risk assessments?*

A. Reporting Impact Metric and Targets

a. *What metrics and targets are most useful and impactful for reporting and communicating NbS benefits to different stakeholders?*

Section 3: NbS Problems & the Role of ESV as a Solution

Focus: Highlight ESV as a tool to overcome scaling, financing, and typology challenges in informing PPP design.

The EUROCLIMA+ Program has developed an instruction manual for the design and implementation of ESV within the framework of NbS. This manual categorizes 4 main problems and ESV solutions in overcoming issues of implementability in NbS projects; **(1)** the definition of the objective, scope, and stakeholders involved, **(2)** the identification and prioritization of ES, **(3)** the assessment of ES and analysis of drivers of change, and **(4)** the implementation of the economic valuation and elements of decision-making. In addressing these, we present 4 solution sections, with corresponding interview questions:

1. **Tackling the Absence of NbS Typology.**

    b. *In 2022 the United Nations General Assembly resolved on a framing and definition of Nature-based solutions, and you mentioned you operate with the IUCN definition of NbS. To what extent can framing typologies such as these one help mainstream NbS?*

2. **Accounting for the Complexity of Scale and Scope**

    a. *In your experience, what approaches are the most effective for accounting for interventions that span multiple scales and scopes of space and time (i.e. landscape approaches)?*

3. **Increasing Public Funding Involvement**

    a. In your experience, what role should public funding play in scaling NbS,

        i. and how can standardized valuation and reporting of NbS economic co-benefits improve confidence among governments, investors, and other stakeholders, in support of PPP development?

Section 4: (for Additional Insights Only, alternative to Section 3): **Nbs as an Asset Class/Informing the Capital Stack.**

Focus: Explore how NbS can be embedded into real economy value chains, capital structures, and investment frameworks using ESV.

1. *How can NbS be integrated across all asset classes, rather than treated as isolated projects, to reflect their real economic and ecological contributions?*
2. *How can ecosystem service valuation (ESV) help define the economic contribution of natural capital and standardize performance benchmarks for NbS investments?*
3. *In your experience, how can ESV inform the design of capital stacks, matching NbS types to appropriate layers of risk and return?*
4. *How can embedding NbS into traditional investment frameworks shift the perception of nature from a liability to an asset class,*
    a. *and what role does ESV play in this transition?*
5. *How do these approaches - integrating NbS into capital markets and value chains - support long-term portfolio resilience, ESG alignment, and the scaling of NbS through public-private partnerships?*

Thank you for sharing your insights and experiences. Before we finish *I would like to ask if you have any additional thoughts, case studies, or examples you feel are important for us to consider.*

We will ensure that your contributions are reflected in our analysis, and we may reach out if we need clarification or follow-up on any of the points you raised. Thank you again for your time and expertise, it is invaluable to this research.

Annex B - TEV Methodology and Data Assumptions

The assessment procedure follows four steps, each carefully designed to capture the economic value of affected ES. These steps are explained in detail below.

Step 1: Understanding and describing the context of the case study and determining the different land cover change scenarios. In order to align the project data with the ESVD, it is crucial to understand the context of the study area and to extract the relevant project information provided by the funds. Based on the data provided, the methodology develops two different land cover scenarios. For each case study, the Business as Usual (BAU) scenario assumes no change in current land cover. The NbS investment scenario describes the changes in land cover that are expected to take place due to the NbS investment.

Step 2: Aligning the provided land cover data with land cover and biome/ecosystem definitions used in the ESVD. Paramount was to match the local land cover information with the ESVD biomes and ecosystems classification. Based on locally provided information, a relevant subset of the ESVD data was created. Creating the data subset is based on two criteria: (1) Most closely resembling the biome/ecosystem types used in the ESVD and (2) the availability of monetary values in the ESVD.

Step 3: Calculating the standardized monetary values of ecosystem services provided by the relevant biome/ecosystems for different land cover scenarios. To create summary statistics from the ESVD data subset, average values in International dollars per hectare per year for a given biome/ecosystem were calculated. To calculate a summary value, average values of different standardized monetary values per ecosystem service for a biome/ecosystem were applied. We removed outlier values (extreme high or low values) based on expert judgement from our own team of specialists.

Step 4: Calculating the Total Economic Value. Finally, changes in monetary value of the total bundle of ES provided by the case study area were calculated to illustrate the implications of an investment in terms of monetary gains and losses for private and public stakeholders. The Total Economic Value (TEV) reflects the actual or potential sustainable use of the total bundle of ecosystem services provided by a particular ecosystem, for a specific area, per year. Usually, TEV is expressed for a specific ecosystem in value/ha/year. To compare the different land use scenarios, the TEV/ha/year is multiplied by the total area of that specific ecosystem, or land use type, in the case study area. The TEV enables comparison of the monetary values of the chosen scenarios before and after the intervention.

Annex C - Lower Chew Valley TEV Granularity Level

Ecosystem Service	*UK0 Intensive Land Use (n = 91)*	*UK1 Forest & Woodland (n = 367)*
Provisioning		
1. Food	National	National
2. Water	ND	Global
3. Raw Materials	European	Removed
4. Genetic Resources	ND	ND
5. Medicinal Resources	ND	ND
6. Ornamental Resources	ND	ND
Regulating		
7. Air quality regulation	National	National
8. Climate regulation	National	National
9. Moderation of extreme events	National	National
10. Regulation of water flows	Global	National
11. Waste Treatment	ND	European
12. Erosion Prevention	ND	Global
13. Maintenance of soil fertility	European	European
14. Pollination	ND	Global
15. Biological control	Global	Global
Habitat		
16. Maintenance of Life Cycles	European	ND
17. Maintenance of Genetic Diversity	Global	Global
Cultural		
18. Aesthetic Information	European	ND
19. Opportunities for recreation and tourism	ND	National
20. Inspiration for culture, art and design	National	National
21. Spiritual Experience	ND	ND
22. Information for cognitive development	European	National
23. Existence, bequest values	European	National

Figure 7. *Granularity of Assessment of the Avon Needs Trees TEV data.*

Annex D - Expert Interview Results Overview

Table 3. *Main messages from Expert Interviews and case studies*

Affiliation and Expertise	Name	Main Message
For General Perspective and Alignment		
Network Nature	Daniela Rizzi	*"We need a study where we can really pick apart the harmful subsidies and how these affect NbS, and say this is the area where we could start, in order of how low hanging the fruit is. Because everyone talks about harmful subsidies, but I never really saw a serious study that deconstructs the subsidies, where would you start?"*
International Institute for Sustainable Development (IISD)	Liesbeth Casier	*"A lot of groups, including engineering firms of course, are doing cost-benefit analysis on their projects. But this information is shielded, and not publicly available at all. The information asymmetry between the public sector and the private sector is real and really impedes the scaling. If we want the public sector to initiate, develop, and drive the projects, there needs to be a certain level of information available, and I think the gap is too big right now."*
Dutch Ministry of Agriculture, Fisheries, Food Security and Nature (LVVN)	Esmee Kooijman	*"Our system is clearly all about money, so we need more economic proof that NbS delivers value. Standardization of certain methods (e.g. standardizations of ES prices) that generate proof that nature also delivers economic benefits at different types of NbS. And this is not something that is there yet."*
Vrije Universiteit Amsterdam and PBL Netherlands Environmental Assessment Agency	Mark Koetse	*"If we do valuation, and we do it well in society: taking the stock of evidence and then use it for practical purposes, if there is still no translational values to accountability and financial streams influencing someone who is involved in making a decision, and making them feel the pain and cost of that decision, then we can value all we want, but it will have very little effect."*
For Additional Insights		

Finance for Biodiversity Foundation	Julen Gonzalez	*"It is important for FfB that NbS can be presented as part of mainstream economic models, generating benefits in terms of returns, resilience, and risk management. They should be considered by companies and financial institutions in decision-making and economic analysis as a source of stability and key tools for sustainability; to advance practices from reducing pressures to effectively generating biodiversity gains towards nature-positive goals."*
International Institute for Sustainable Development (IISD)	David Uzsoki	*"It's not philanthropy. It could be like a viable investment authority with the right instruments in place with the right financing structure in place. We don't have to claim that it's going to be 40% private finance, but even if it's a brand finance structure, there is a role to play for more mainstream capital. Forestry and regenerative agriculture, that's basically quantifiable. I'm completely OK with starting with a low hanging fruit and just getting investors comfortable with the whole concept of natural capital investing."*
INVEST NL	Nina Waldhauer	*"Things are so interconnected, but we are trying to dissect them so much into smaller things that we are not helping. Maybe it's also a cultural difference, but especially in Spain, Cyprus, and Greece it is much more about how nature brings people together and that that's a positive effect [in and of itself], and then there's biodiversity benefits. NbS is much less about the economic benefits when compared to the Western Europe."*
EcoShape	Petra Dankers	*"Ecoservices valuation, while an important aspect in getting more sustainable projects implemented, will only happen if, top down, this is enforced. So it needs to be in legislation, in everything. It is the institutional setting that can play a big role in making sure that it is landing in the request for proposals. The companies are ready to do this; it is just a matter of bringing this there."*