Exploration of the role of (data on) ecosystem services valuation in landscape development

A FIRST COMPARISON BETWEEN PROJECTS IN THE NETHERLANDS, THE UNITED KINGDOM AND IRELAND

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Foundation for Sustainable Development

Abbreviations

DEFRA - Department for Environment, Food & Rural Affairs

ENCA – Enabling a Natural Capital Approach

ES – Ecosystem Services

ESP – Ecosystem Services Partnership

ESVD – Ecosystem Services Valuation Database

GBF – Global Biodiversity Framework

INCASE - Irish Natural Capital Accounting for Sustainable Environments

IUCN – International Union for Conservation of Nature

NbS – Nature-based Solutions

NBSAP - National Biodiversity Strategy Action Plan

PBAF – Platform for Biodiversity Accounting Financials

PES – Payment for Ecosystem Services

ROI – Return on Investment

SEEA EA -System of Environmental Economic Accounting Ecosystem Accounting

TEV – Total Economic Value

UK – United Kingdom

UN – United Nations

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Executive Summary

In this project, commissioned by Caroline van Leenders from the Dutch Enterprise Agency (RVO), the Foundation for Sustainable Development (FSD) researched potential collaborations between the United Kingdom, the Netherlands and Ireland aiming to enhance decision-making processes and to promote sustainable development. The main objective was to explore the applicability of the monetary valuation of ecosystem services (ES) to support opportunities for knowledge exchange and sharing potential policy actions within the context of the Global Biodiversity Framework (GBF) and the National Biodiversity Strategy Action Plans (NBSAPs).

For the project, we researched the Ecosystem Services Valuation Database (ESVD) and the British Enabling a Natural Capital Approach (ENCA), the Irish Natural Capital Accounting for Sustainable Environments (INCASE) and the NL2120 initiatives and additional literature. Based on this, we discuss entry points for collaboration within the three countries on the economic valuation of ES and Nature-based Solutions (NbS) using a landscape approach, with the aim to account for the value of nature and her protection and conservation in alignment with the GBF targets. Moreover, we highlight opportunities for the development of financial products to address finance gaps in relation to related targets and the overall mission and vision of the GBF.

Throughout the project, it became clear that a shared challenge of the Netherlands, the United Kingdom and Ireland is to adapt to and mitigate the effects of global warming in the context of water management and that ES can assist in addressing these challenges (related to GBF targets 1, 2, 3, 4, 7, 8). Moreover, we found clear ES valuation data gaps in both the ENCA and INCASE initiatives, despite significant investments in ES approaches in the respective countries. This is relevant because monetary valuation data is crucial for adequately addressing additional GBF targets 10, 11, 15 via the NBSAPs because it indicates the order of magnitude of the benefits of nature in monetary terms.

The ESVD, as currently the largest database with monetary values on ES, could address some of these data gaps. Moreover, we found the need to integrate all relevant ES in the initiatives, also regulating and supporting ES. These ES are not directly visible in economic analysis because they are not marketable. Due to the absence of this data, the benefits of green interventions remain undervalued and sometimes unnoticed. Therefore, there is the likelihood that, despite good intentions, the NBSAPs will not deliver desired outcomes in the protection, restoration and conservation of nature.

Furthermore, it was clear that England and Ireland have much experience with integrated catchment management (a type of landscape approach) as also seen in ENCA and INCASE, to sustainable manage nature and her resources. The Netherlands can gain from these experiences (related to GBF targets 20 & 21) as landscape approaches which include NbS have the potential to be the connecting factor in many of the Dutch spatial challenges. There are currently many policies and programs focusing on nature in rural areas and cities separately, while these ecosystems are interconnected and so are the ES and the benefits people derive from these ES.

Finally, Payment for Ecosystem Services (PES) schemes could be promising to incentivize new financing mechanisms to reach GBF targets 18 and 19. Having information on the monetary societal and economic benefits of all ES is imperative for the design and scaling-up of PES schemes to protect and conserve ecosystems. PES schemes are vital to identify and link relevant public and private stakeholders which benefit from and stakeholders which safeguard, protect and provide these ES.

Finance mechanisms to pay for the protection of these ES via PES schemes can incentivize mobilization of private finance to invest in economically and ecologically sound NbS on a landscape level. In building a business case, showing a Total Economic Value (TEV) of all ES in a NbS scenario

compared to the ES in a grey scenario is helpful because a TEV has the potential to shift the narrative that investing in nature lacks financial returns. The observation in the project that many GBF targets are connected and that ES valuation can be beneficial for many targets, indicates the need for an overarching framework. A need which can be addressed by applying a landscape-based approach. Hence, the NBSAPs should not be developed per GBF target but should be developed holistically in a landscape approach.

To provide higher success rates for programs like NL2120, for the implementation of the NBSAPs, and for NbS to be implemented, it is beneficial to collaborate with other countries, such as the UK and Ireland. The Netherlands has a steep learning curve ahead and to exchange knowledge and facilitate learning and co-creation, collaborations have to be fostered. Useful platforms like the Ecosystem Services Partnership (ESP), the Business for Biodiversity platform, which is an initiative from the European Commission and the Partnership for Biodiversity Accounting Financials (PBAF could be to be actively and consciously utilized to foster these collaborations. Exponential learning is an essential step in achieving the GBF targets and halting and reversing biodiversity loss by 2030 and to leave behind a world full of flourishing nature to humans and other species who come after us.

Based on these insights, we offer some specific and concrete advice to Dutch policymakers:

- To prioritize collaborative efforts with neighboring countries such as, but not restricted to, the United Kingdom and Ireland, to address water management issues and best practices
- To prioritize research and data collection for ES with a focus on water-related ecosystems.
- To adopt similar catchment and landscape-based strategies for NL2120 as the UK and Ireland.

Building from these insights we offer the following general policy recommendations:

- Invest in the collection of regulating, supporting and cultural ES value estimates, with a particular interest on avoided damage costs and replacement costs. By incorporating these estimates into decision-making processes, policymakers can better assess the economic viability of NbS compared to Business-as-Usual (BaU) solutions and create payment pathways to protection.
- Extend the statistical natural capital accounts to encompass a broader set of ES values, as emphasized by the IPBES Value Assessment. This expansion will illuminate stakeholders and enhance the engagement of affected parties, crucial for the success of PES mechanisms. Collaboration with relevant government departments like the statistics offices from different countries, should be intensified to truly adopt this expansion beyond market prices.
- Recognize the crucial role of landscape-based approaches and PES schemes in the NBSAPs.
- Develop and implement landscape-based PES schemes in the Netherlands, integrating ES valuation to support the reduction of pollution levels as outlined in Target 7 of the GBF.

And finally:

- Establish a cross-border knowledge exchange program focused on landscape-based approaches, inviting experts and practitioners from the UK, Ireland, and the Netherlands to share experiences, lessons learned, and best practices. This program should include workshops, seminars, and field visits to facilitate direct interactions and knowledge transfer. Additionally, a dedicated online platform or resource center to centralize information, case studies, and tools related to catchment- and landscape-based management, accessible to stakeholders in all three countries is useful. This initiative will enable the Netherlands to learn from the experiences of the UK and Ireland, enhancing its capacity to develop and implement effective policies for integrated landscape management and NbS.

1 Introduction

This report is a comparative study on ecosystem services (ES) valuation projects in The Netherlands, UK and Ireland. Commissioned by Caroline van Leenders from the Dutch Enterprise Agency (RvO), the report marks a significant step in understanding mutual challenges in water management and climate adaptation through the lens of ES. As the challenges we are facing due to climate change and biodiversity loss are rapidly evolving, this project seeks to enable collaboration between the Dutch, Irish and British governments.

The main objective is to explore opportunities for knowledge exchange and sharing potential policy actions between the Netherlands, the United Kingdom, and Ireland in the field of monetary valuation of ecosystem services and its usability within the Global Biodiversity Framework (GBF). This collaboration then aims to enhance decision-making processes and promote sustainable development across national borders.

1.1 The Foundation for Sustainable Development

The Foundation for Sustainable Development (FSD) is in support of these ambitions, as a not-for-profit research and consultancy foundation, supporting the conservation and sustainable use of natural ecosystems through building knowledge and awareness of the ways people benefit from and interact with nature. FSD's core programs: the Ecosystem Services Valuation Database (ESVD), the Ecosystem Services Partnership (ESP) and Nature Today represent this work. In the context of this project, the ESVD and ESP will be discussed.

1.2 Objectives

This project outlines different initiatives on the monetary valuation of ES, focusing on the ENCA, INCASE and ESVD datasets on natural capital. It builds a bridge how ES valuation data can be of pivotal support for Dutch programs such as NL2120. It addresses water-management related knowledge gaps and innovative practices like value transfer functions and landscape-based approaches that highlight the potential for knowledge exchange. The report relates the different project insights to the targets of the GBF and describe how ES valuation plays an essential role in the design of innovative Payment for Ecosystem Services (PES) mechanisms and the National Biodiversity Strategy Action plans (NBSAPs). Therefore, the objectives of this short project are:

1. To gain shared insights of the potential contribution of the British Enabling a Natural Capital Approach (ENCA), the Irish Natural Capital Accounting for Sustainable Environments (INCASE) and the Dutch NL2120 program for joint efforts in the monetary valuation of ES, especially those related to water management that underpin Payment for Ecosystem Services schemes.

2. To assess the potential for developing innovative Payment for Ecosystem Services schemes and mobilizing the private sector. Identify necessary policy actions to implement these schemes.

3. To enhance the understanding of the monetary value of nature and integrate this knowledge into economic policy development, spatial planning, and financial decision-making in the context of the National Biodiversity Strategy Action Plans and the Global Biodiversity Framework.

4. To promote cross-border knowledge exchange and cooperation in land restoration, nature-related financial decision-making and policy making.

1.3 Readers guide

At the core of this is project are ES and the links with water ecosystems, the GBF targets and the embeddedness in landscape approaches and Nature-based Solutions (NbS). At the core of FSD stands the monetary valuation data in the ESVD. Therefore, the monetary valuation data of the ESVD formed the starting point of this project and forms the foundation of the report.

Chapter 2 sets the scene and describes the need for sustainable development, the GBF, the perspective of ES valuation and how this supports the NBSAP development. Moreover, it addresses the application of ES valuation that is needed to ensure that these scientific assessments lead to better outcomes in practice. Finally, the financing gap for restoring biodiversity and nature is described which points towards the challenges to attract and incentive private finance to halt biodiversity loss and to promote conservation and restoration.

Chapter 3 describes the methodologies and data collection that have been used in this project, starting with the monetary valuation data in the ESVD. This is linked to the ENCA, INCASE and NL2120 programs. Additionally, literature research was conducted to support other methodologies.

Chapter 4 structures the identified themes and elaborates on the insights that emerged from this explorative study. It starts with the identification of water as a common challenge for all countries and describes the monetary valuation gaps in ENCA and INCASE and the contribution of the ESVD to these gaps. It then focuses on a specific type of landscape approach, namely a catchment-based approach, in ENCA and INCASE to sustainably manage natural resources. In this project, a catchment-based is a form of a landscape-based approach specifically related to water. Subsequently, the application of ES in a landscape approach, via NbS, then shows the financial opportunities to contribute to unlock private finance and stop harming subsidies as described in targets 18 and 19 in the form of PES schemes. Finally, the chapter describes different entry points for collaboration as found in this project.

Chapter 5 summarizes the conclusions based on the results of the project and chapter 6 poses recommendations for policymakers following the gained insights.

2 Setting the Scene

2.1 The need for sustainable development

The need for sustainable development is widely recognized, but human societies are still far from achieving a sustainable relationship with the natural environment. On a global scale, ecosystem degradation and loss of biodiversity continue at an alarming rate. The main purpose of sustainable development is to safeguard the long-term health of the biosphere, our only life support system in an otherwise harsh cosmic environment. An integrated approach to man-environment interactions is essential to bridge the gap between long-term ecological goals and short-term economic interests.

Biodiversity decline persists as a global concern, as evidenced by the WWF's Living Planet Report (2022), which reveals a staggering 69% decline in wildlife populations since the 1970s. The state of biodiversity in Europe is also bad. Only 15% of habitat assessments have a good conservation status, with 81 % having poor or bad conservation status at EU level and 4 % reported as unknown (EEA 2020). Figure 1 shows the conservation status of habitats in European countries in the period 2013-2018.

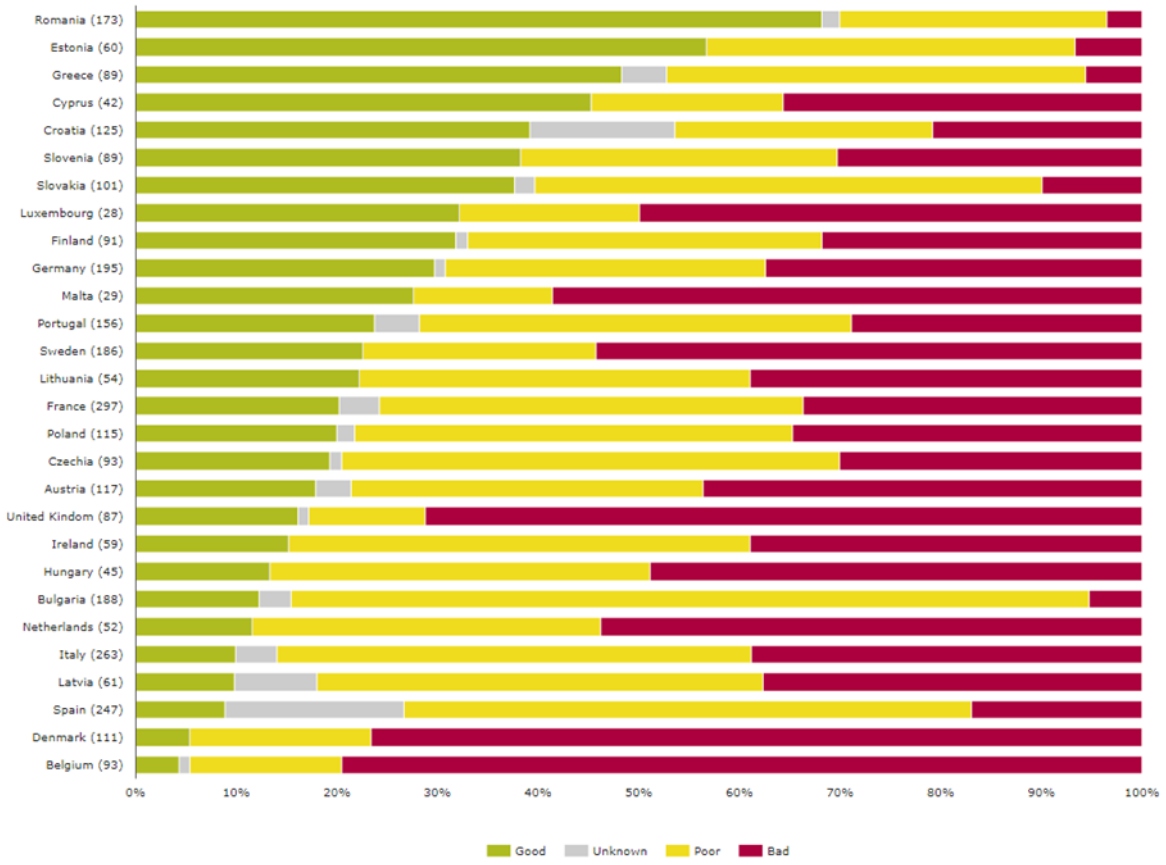

Figure 1: Conservation status of habitats at member state level (2013-2018) [1]

The Dasgupta review (Dasgupta 2021) delves into the roots of this crisis, highlighting the undervaluation of nature's goods and services. Aspects of nature, often freely available, remain unaccounted for, leading to skewed investments that favor produced capital over natural assets. The OECD estimates the colossal costs of inaction on biodiversity loss—trillions of dollars lost annually due to land-cover change and degradation (OECD 2019). These losses, however, remain invisible in

[1] https://www.eea.europa.eu/en/analysis/indicators/conservation-status-of-habitats-under

investment assessments, labeled as externalities and deferred to future generations. This undervaluation of nature carries profound societal and economic ramifications, affecting societies and economies.

2.2 Global Biodiversity Framework

Within the context of biodiversity loss and ecosystem degradation, the global community is trying to take action to counteract the deterioration of nature and decrease of biodiversity. In 2022, the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted during the fifteenth Conference of the Parties on biodiversity (CoP 15). The vision of the GBF is a world of living in harmony with nature where

"by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

The 2030 mission of the GBF is:

"To take urgent action to halt and reverse biodiversity loss to put nature on a path to recovery for the benefit of people and planet by conserving and sustainably using biodiversity and by ensuring the fair and equitable sharing of benefits from the use of genetic resources, while providing the necessary means of implementation."

The GBF has four long-term goals for 2050 related to the 2050 Vision for biodiversity (figure 2)

A. Protect and restore.
B. Prosper with nature.
C. Share benefits fairly.
D. Invest and collaborate.

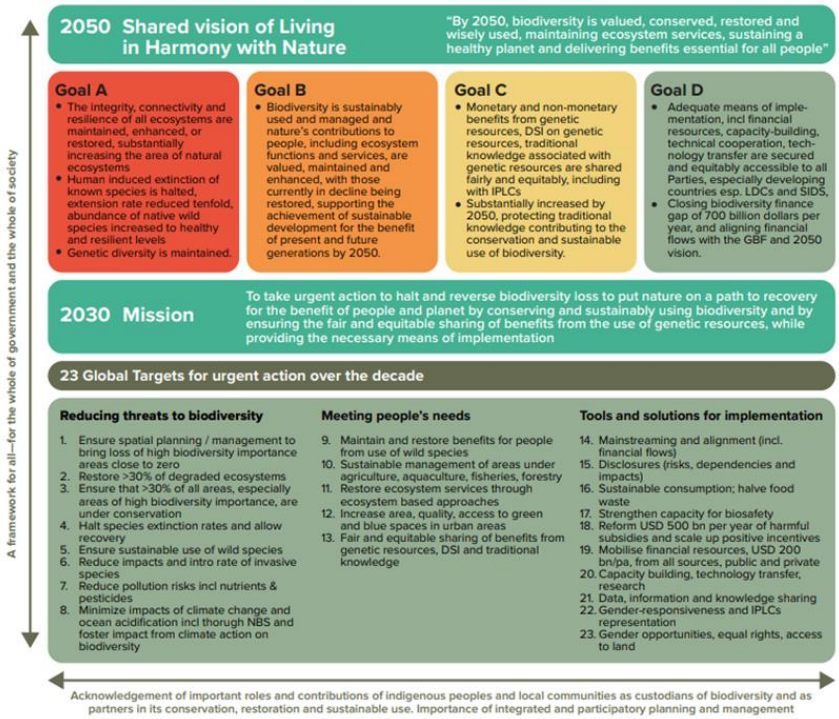

Figure 2: The Global Biodiversity Framework[2]

[2] https://www.cbd.int/gbf/

These long-term goals are translated into 23 action-oriented global targets for urgent action over the decade to 2030. The actions set out in each target need to be initiated immediately and completed by 2030. To facilitate implementation, the GBF requests nations to develop their National Biodiversity Strategy Action Plans (NBSAP). These NBSAPs need to involve all stakeholders, private and public, to work towards a just transition and to ensure the success of the GBF targets. The Netherlands is currently in the process of preparing the NBSAPs, one NBSAP per GBF target.

2.3 The monetary valuation of ecosystem services

A concept very closely related to and mentioned in several targets of the GBF (see Annex 1 for a comprehensive overview of how ES applications can support the GBF targets), is the concept of ES. ES refer to the direct and indirect benefits that humans derive from natural ecosystems. ES are sorted in four main categories: provisioning, regulating, habitat and cultural services (see Box 1). The concept of ecosystem services highlights the intricate connection and dependence of our societies and economies on ecosystems, and their contribution to human welfare in general.

BOX 1: MAIN ECOSYSTEM SERVICES TYPES (CATEGORIES) AND THEIR DEFINITION

Ecosystem services are defined as "the direct and indirect contributions of ecosystems (biodiversity and nature), to human wellbeing" and comprise the following four main categories:

- Provisioning services are the products or resources that can be harvested or extracted from ecosystems (e.g., food and raw materials).
- Regulating services are the benefits obtained from ecosystem processes that maintain environmental conditions beneficial to individuals and society (e.g., climate regulation, air quality, flood protection, biological control, pollination).
- Habitat services are the benefits provided by protecting a minimum area of natural ecosystems to allow evolutionary processes needed to maintain a healthy gene pool and by providing essential space in the life cycle of migratory species, many of which have commercial value elsewhere (notably the nursery service of mangroves and other coastal systems).
- Cultural services are the experiential and intangible benefits related to the perceived or actual qualities of ecosystems (e.g., spiritual enrichment, cognitive development, recreation, aesthetic enjoyment, and the appreciation of the existence of diverse habitats and species).

The concept of ES has recently become more prevalent in public and private decision-making. In 2021, the United Nations adopted the System of Environmental Economic Accounting - Ecosystem Accounting (SEEA-EA) approach (United Nations Statistics Division 2021). The SEEA-EA constitutes an integrated and comprehensive statistical framework for organizing data about habitats and landscapes, measuring the ES, tracking changes in ecosystems, and linking this information to economic and other human activity. The SEEA-EA organized its environmental information to make it coherent with economic information which is organized according to the System of National Accounts (SNA), with the aim to integrate environmental information in existing national statistical frameworks. Examples of these are the Dutch Natural Capital accounts and the "Atlas Natuurlijk Kapitaal".[3]

Similar projects have been developed in the UK and Ireland, notably ENCA[4] and INCASE[5]. These frameworks can be applied well on a national level, but there are limitations in application on local levels. Moreover, the models are not easily transferable to a private or public decision-making process as they operate on different spatial and temporal scales. Finally, since these Natural Capital models focus on ecosystem accounting (SEEA-EA), only ES that can be valued through (observed)

[3] https://www.atlasnatuurlijkkapitaal.nl/
[4] https://www.gov.uk/guidance/enabling-a-natural-capital-approach-enca
[5] https://www.incaseproject.com/

market prices can be included. Services based on welfare approaches (shadow prices) are not (yet) included, while in the context of financial, either public or private, decision-making they represent highly interesting and relevant information for spatial/environmental management and the development of an economically sound and nature positive business case.

To facilitate assessing the impact of changes in land cover and biodiversity on ES in monetary terms, the Ecosystem Services Valuation Database[6] (ESVD) was developed. The ESVD is currently the largest publicly available database with standardized monetary values in dollars, per hectare, per year, for all ES and all biomes, on all continents, including all different approaches (including welfare approaches) to monetary valuation. The ESVD now contains over 10,000 value records from over 1,200 studies and new values are added continuously.

With the ESVD, a Total Economic Value (TEV) can be calculated based on summing the values for individual ES. The TEV represents the total flow of ES for a given area per year. This offers important insights on the impact of an intervention (and the investment backing that intervention) on the natural surroundings. By calculating the TEV for different scenarios (see table 1) we gain insight in the different tradeoffs in ES triggered by the different scenarios.

Table 1 TEV calculation taken from Make Nature Count study of ASN Bank and FSD in 2022. It lists the ES provided in different land-use scenarios and its monetary value in both scenarios.

This TEV, also often referred to as an “integrated ecosystem services assessment”, shows the ‘true’ values of an ecosystem, beyond the limited market values. Most regulating, habitat and cultural services, are vital to societies and economies, but cannot be traded in markets. Case studies such as the Make Nature Count studies from ASN Bank and FSD make these ‘hidden’ benefits visible and shed a new light on the importance of ecosystems for a broader group of stakeholders. Relating the change in land cover to changes in benefits, for private as well as for public stakeholders

In recent years, the ESVD has increasingly been used in the context of private and public decision-making, moving from a favorite academic research database to “real world” practical appliance.

ES and their subsequent economic (monetary) valuation helps to translate local, ecological information into economic and policy-relatable terms. ES valuation provides a common language to discuss the impact and dependencies of all stakeholders on the benefits that individual humans and societies receive from nature. From this perspective, it only seems logic to use the collected data on ES valuation to support the development of the NBSAP`s. We will further elaborate on this in Chapter 4.

[6] www.esvd.info

Services	Scenario 1: Current agriculture	Scenario 2: Future forests	Difference
Provisioning services	**86.1 K**	**1.6 K**	**-84.5 K**
Food	86.1 K	0.03 K	-86.1 K
Water	$0	$0	$0
Raw materials	$0	1.5 K	1.5 K
Genetic resources	$0	$0	$0
Medicinal resources	$0	$0	$0
Ornamental resources	$0	$0	$0
Regulating services	**$0**	**87.6 K**	**87.6 K**
Air quality regulation	$0	63.2 K	63.2 K
Climate regulation	$0	12.2 K	12.2 K
Moderation of extreme events	$0	0.2 K	0.2 K
Regulation of water flows	$0	4.8 K	4.8 K
Waste treatment	$0	$0	$0
Erosion prevention	$0	7.1 K	7.1 K
Maintenance of soil fertility	$0	$0	$0
Pollination	$0	$0	$0
Biological control	$0	$0	$0
Habitat services	**$0**	**99.7 K**	**99.7 K**
Maintenance of life cycles	$0	$0	$0
Maintenance of genetic diversity	$0	$0	$0
Existence, bequest values	$0	99.7 K	99.7 K
Cultural services	**0.1 K**	**22.8 K**	**22.7 K**
Aesthetic information	0.01 K	$0	-0.01 K
Opportunities for recreation and tourism	$0	14.8 K	14.8 K
Inspiration for culture, art and design	0.1 K	$0	-0.1 K
Spiritual experience	$0	$0	$0
Information for cognitive development	$0	8.0 K	8.0 K
Total	**86.2 K**	**211.7 K**	**125.5 K**

Table 1: TEV of current agricultural use in the Geelders compared to turning the area into forest. Total area 40ha, values in $2020/year. The grey color signifies the services which are provided by the ecosystem, but for which no valuation data exists. The cells in the last column with a green background show the increase in the monetary value of ecosystem services after the land cover change from agriculture to forests and the cells with a red color, the services which are negatively influenced by the land cover change. Make Nature Count, 2022

2.4 The financing gap

Finally, we address a challenge that is also described under target 19 of the GBF, namely to mobilize financial resources, US$ 200 billion per year, from all sources public and private.

As described in the former paragraph, recognizing and valuing all ES is not only a matter of common sense, but also a critical component of responsible policy-making and of reporting. With regards to reporting, the GBF is clear in target 15, to disclose risks, impacts and dependencies on nature. The Make Nature Count 2.0 report published by ASN Bank and FSD[7] (De Jong & van 't Hoff et al, 2023) revealed that while regulating and cultural services play a pivotal role in maintaining the overall health and resilience of ecosystems, and are critical for human societies and nature alike, they are often not considered as they do not fit the traditional market logic because they are unpriced public goods.

This links directly to the financing of target 19 because it describes the undesirability for private investors to invest in more sustainable practices, as they receive no direct financial gain from the improvement of these services. This poses a challenge in how to finance nature as described in target

[7] https://www.asnbank.nl/nieuws-pers/neem-de-waarde-van-de-natuur-mee-in-financiele-besluitvorming-.html

19, but also poses challenges for the national implementation of the NBSAP`s: how to leverage private financial capital to build a sustainable future?

In the recent decade, PES schemes were positioned to be one of the solutions that answered to the challenge. Through compensating individuals, organisations or communities for the environmental services they care for, PES programs aim to create a direct link between those who benefit from these services and those who maintain them (Fripp, 2014). The basic idea is that individuals, communities, or organizations responsible for maintaining or enhancing specific ES receive financial or in-kind payments as an incentive for their conservation efforts by those who benefit from these conservation efforts. PES is often used as a market-based approach to address environmental issues and promote sustainable resource management (Fripp, 2014).

For PES to work, they must provide a win-win solution for both the beneficiaries and providers of the relevant ES, as PES programs do not only help to protect the environment, but also support the livelihoods of those who depend on ES. However, implementing effective PES programs requires careful consideration of local contexts, property rights, and ecological dynamics.[8]

In the context of this project, we searched for insights that offer a path for the upscaling of PES schemes to unlock private financial capital. Several challenges and recommendations for the combination of PES schemes in financial products such as Blended Finance have already been researched thoroughly (Wolfs Company, 2023). An important insight stemming from that report about private finance opportunities for biodiversity is that:

"…..These opportunities must always have a potential revenue line that can yield a financial return to the respective investor. Given the currently limited availability of replicable and scalable biodiversity-related opportunities (as compared to carbon-related ones, for example), specialized technical and financial assistance seems necessary to refine and standardize (new) approaches to create these opportunities where possible."

Therefore, this project on discovering financially interesting and nature positive opportunities, the potential role PES schemes in these opportunities and the necessary policy actions to facilitate the uptake of these opportunities.

[8] https://viz.naturalcapitalproject.stanford.edu/GreenGrowthBook/

A special place for NL2120

Remarkable projects have been developed throughout the last years preparing for these challenges. An important project that will often be referred to and will return to throughout this report is NL2120.

NL2120 is a decade-long knowledge and innovation initiative with the primary objective of developing and implementing Nature based Solutions (NbS) to tackle pressing environmental challenges in the Netherlands. These challenges encompass climate issues, sustainable agriculture, biodiversity, and housing. This initiative stands out as a unique collaboration involving governments, NGOs, industry, and educational institutions. NL2120 is dedicated to the creation and implementation of nature-based solutions to address contemporary climate and biodiversity challenges, with a particular emphasis on incorporating a natural capital approach into its strategy. The NL 2120 program is part of the overarching research program Nature-Inclusive Transitions . The goal of Nature-Inclusive Transitions is to understand functioning of ecological systems and to develop and implement systemic solutions to enhance biodiversity while providing for the needs of society.

“In the knowledge program NL2120, governments, nature organizations, engineering firms, dredging companies and knowledge and professional institutions work together on nature-based solutions for major challenges in the areas of climate, nature-inclusive agriculture, biodiversity and housing. NL2120, which is financed through the Dutch National Growth Fund, is one of the largest partnerships in the world in the field of nature-based solutions.”

3 Methodology and data collection

The broad scope of the project required the use of several approaches to collect relevant and useful data. At the core of this is the valuation data, using the ESVD. The ESVD data was connected with the ENCA platform (including databases, guidance documents and tools), INCASE project and NL2120 program. Similarly, interviews and expert meetings with stakeholders were conducted and linked to the above-mentioned.

3.1 Methodology

In this section, we provide a brief overview of the methodologies we used in this comparative study. We outline the research design, case selection process, data collection and analysis methods, as well as considerations for validity, reliability, and ethical practices."

Research design: Given from the project description the research was designed as a comparative study focusing on economic valuation of ES and its usability across different programs and countries, namely the Netherlands, the United Kingdom, and Ireland. The study involves assessing existing data and databases, and explores connections between economic valuation of ES, PES schemes, and the Global Biodiversity Framework targets.

Case selection: Given from the project description we focused on the NL2120 program, The ENCA platform, the INCASE program, the ESVD and the ESP (Ecosystem Services Partnership). These cases differ greatly in what they are (projects, platforms and programs) but do share the same intention, namely to use ES approaches to tackle environmental challenges.

Data collection: The data collection process involved the collection of ESVD data on the UK and Ireland between September and November 2023. Additionally, in the same time period, a comprehensive literature review of INCASE, ENCA and NL2120 was conducted to gather information for comparison. Additionally, stakeholder interviews and expert discussions were held between September and December 2023 to obtain firsthand perspectives and insights from relevant individuals (see the annex for more details and insights on the methods and programs).

Data analysis: The data analysis process used both qualitative and quantitative techniques. Qualitative analysis involved the examination of interview notes to identify recurring themes, patterns, and insights from stakeholder discussions and expert input. Quantitative analysis entailed analyzing relevant ESVD value estimates and information gathered from literature reviews and other sources to identify trends and relationships pertinent to the research objectives. These analyses provided a comprehensive understanding of the current status of economic valuation of ES in the three countries and highlighted favorable opportunities for financial investments through the application of ES valuation methodologies

Limitations: While a substantial number of ES valuation data and insights on catchment-based approaches in England were collected, the sheer volume and complexity of the information posed challenges in synthesizing and analyzing it effectively. Relatedly, we encountered a significant challenge in aligning and synthesizing the information to derive meaningful insights given the large diversity in goals, aims, structure and outputs of the ENCA, INCASE and NL2120. Therefore, due to the limited time and budget of this comparative study, we had few opportunities to coherently synthesize and compare the initiatives in great detail. Consequently, some of the conclusions rely on expert judgment rather than quantitative analysis (such as linking NbS with PES schemes). However, based on the expertise of the authors and their involvement in numerous knowledge and expert groups, as well as collaborations over the years with other experts collecting similar data, we believe that the

conclusions, whilst limited, hold ground. Additionally, stakeholder interactions often yielded limited feedback, requiring in-depth discussions and illustrative presentations to gain meaningful responses. Despite these challenges, steps were taken to verify the accuracy and credibility of the data through thorough documentation and transparency in the research process. These efforts slowed down the delivery of the final report, but it contributed to enhancing the validity and reliability of the study findings, ensuring that conclusions drawn were well-founded and robust.

4 Identified themes and insights

Given the diversity in datasets and the wide range of collected data, we came to realize the necessity of proposing a structured approach to distill key themes and insights. In light of this, rather than constructing the results as a series of individual studies on the different datasets (INCASE), platforms (ENCA), programs (NL2120) and frameworks (GBF, etc.), we opted to organize our findings under three overarching themes:

1. Water as a common denominator.
2. Financial opportunities: Painting the ES valuation picture.
3. Interest in knowledge sharing and cross-national collaboration.

Within each theme, we explore the relevance for water management, PES schemes, and opportunities for policy development. Additionally, we draw connections to the GBF and integration of the findings in the development of the NBSAP`s. Moreover, in separate boxes throughout the themes we relate the findings to the NL2120 project providing additional insights.

4.1 Water as a common denominator

The extensive literature review and data analysis on the topic of available ES valuation in the ESVD, ENCA and INCASE datasets highlighted an interesting lack of ES valuation data for water-related ecosystems. This interest was underscored by the various stakeholder meetings throughout the project (see annex 7 for the contacted stakeholder overview). For example UK`s Department for Environment, Food & Rural Affairs (DEFRA) reached out through there Skillful Economics working group and their Learning and Development department to learn more about monetary valuation of ES.

During these meetings, it appeared that the representation from the Green Finance Team and the Flood and Water Management Departments was dominant. Although gathering feedback and facilitating discussions during these seminars was limited, the clear interest for the water management and water-related ecosystems was notable. In further meetings with representatives from the Irish Business and Biodiversity platform and the UK and Ireland based ESP members and ES experts it became apparent that the most urgent threats and need for climate adaptation interventions were, again, related to water.

4.1.1 About water-related climate adaptation needs.

The Netherlands, the United Kingdom and Ireland all experience large flooding risks due to their low-lying geographies, with extensive coastal areas and river systems (Thorne, 2014, PBL, n.d., Kulp., Straus, 2019). Each country has an intricate network of rivers, and managing river systems is crucial for preventing both riverine and coastal flooding. Tackling these issues requires maintaining proper drainage systems, constructing flood defenses, and addressing issues such as riverbank erosion. Urbanization and global warming contribute to increased flood risks. Additionally, coastal areas are at risk of inundation, necessitating measures for coastal defense and adaptation.

Rapid urbanization and the expansion of infrastructure contribute to changes in land use, impacting natural water systems (Kulp, Strauss, 2019). Managing urban drainage, stormwater runoff, and ensuring sustainable urban development are common challenges. Ensuring the quality of both surface water and groundwater is essential for drinking water supply, agriculture, and ecosystems. Pollution from agricultural runoff, industrial activities, and urban sources affects water quality in all three countries.

Climate change leads to more unpredictable and extreme weather events, including heavy rainfall and storms. All three countries need to adapt their water management strategies to cope with changing precipitation patterns and the increased frequency and intensity of extreme weather events. Many water bodies in these regions across national borders, requiring collaboration and coordination in water management efforts. Shared river basins and transboundary water issues necessitate joint initiatives for effective management. While flooding is a significant concern, periods of water scarcity and drought can also occur. Managing water resources efficiently, implementing water conservation measures, and planning for drought resilience are shared concerns that we noted from the various stakeholder meetings.

All these problems could benefit from the integration of ES perspectives to highlight the importance of sustainable water management for public welfare and to display the value of nature in protecting, enabling and providing water-related resources. This is one of the driving forces behind each country's investments in the development of their natural capital accounts as described in Chapter 2.

4.1.2 Water-related ecosystems and the data gaps

When comparing the representation of monetary values for British and Irish water-related ecosystems in the ESVD, it seems there is an underrepresentation of data in the 2 countries. The total number of value estimates for all biomes in the UK is 1,443, based on 188 studies, from which a large concentration of studies is around urban centers (see also annex 2). Figure 3 describes the number of value estimates per biome for the UK. Approximately 28% comes from temperate forests, only 12% of the total value estimates relates to marine biomes while approximately 11% relates to rivers. For Ireland only 12 value estimates were available in the ESVD (not shown).

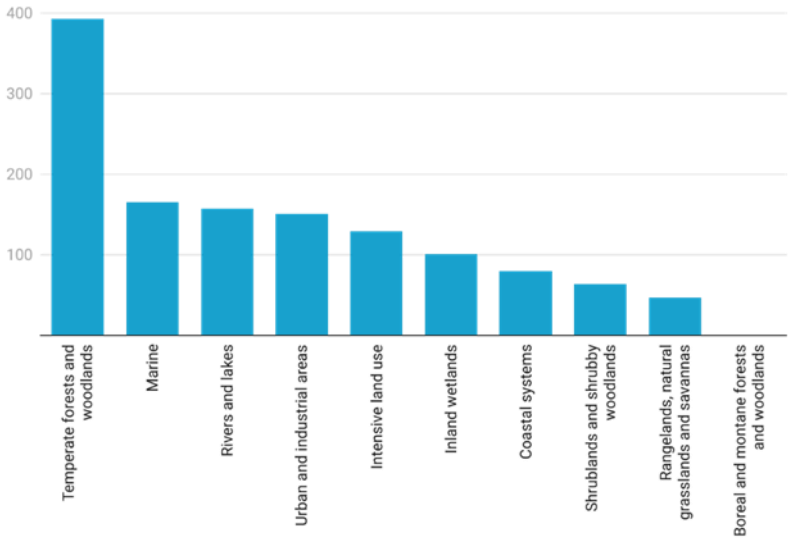

Figure 3: Number of value estimates in the UK per biome in the ESVD.

This lack of ES value estimates for water-related ecosystems in the ESVD is also observed throughout the different national natural capital datasets including ENCA and INCASE (See Annex 4 and 5 for a detailed analysis of these datasets). This is an important insight and this lack of data for ENCA and INCASE highlights possibilities to collaborate with the ESVD for the inclusion of primary valuation studies in the ESVD.

Although sometimes there is data available for a water-related ecosystem, the distribution of the data is uneven. Table 2 shows the number of ESVD value estimates in the Netherlands, UK and Ireland respective countries per ecosystem service and ecosystem and the standardized monetary value per

hectare per year per ES. It shows that, although there many marine-related ES values (n=106), there is data for only 4 different ES out of the 23 ES (See chapter 2.2 for the 23 ES). Similarly, for the 'Rivers and lakes' biome, there are no monetary value estimates for several relevant ES, such as the moderation of extreme events or waste treatment and only one for regulation of water flows. The missing data highlights a large gap in the understanding of the true economic and societal value of these ecosystems.

Although there is widespread acceptance that there are large water-related issues (see chapter 4.1), there seems to be lacking data on the importance of these water-related ES in economic terms. Policy analysis depends heavily on economic indicators and not having sufficient data limits the ability to provide the complete picture of the importance of water-related natural ecosystems. Having an indication on the order of magnitude of the monetary value of the ecosystems and all their ES, as table 2 shows, allows for better integration of these values into policy analysis. It indicates the welfare value, a measure of importance of nature for societies at large. It allows for scenario analyses, which can indicate which ES are decreased and the impacts of this on stakeholders in society in case of ecosystem loss or degradation. For example, if a riverine area is lost to urbanization, only the value of recreational losses are already on average approximately $2,000 per hectare per year.

Biome / Ecosystem service	Marine $ha/yr (n)	Coastal systems $ha/yr (n)	Inland wetlands $ha/yr (n)	Rivers and lakes $ha/yr (n)	Temperate forests and woodlands $ha/yr (n)	Intensive land use $ha/yr (n)	Human made structures $ha/yr (n)	Urban and industrial areas $ha/yr (n)
1. Food	29 (1)	1,812 (17)	2,000 (4)	252 (1)	5.74 (5)	1,375 (7)		1,192 (1)
2. Water		699 (2)	612 (1)	12,311 (5)			118,027 (2)	
3. Raw materials		488 (11)	1,162 (6)		33 (17)	491 (6)		409 (2)
4. Genetic resources		11 (1)						
7. Air quality regulation		223 (7)	2,762 (8)		1,146 (295)	506 (7)		10,384 (93)
8. Climate regulation		107 (14)	127 (10)	21 (2)	441 (13)	49 (6)		1,529 (14)
9. Moderation of extreme events		7,472 (3)	4,330 (8)		39 (2)	17 (4)		869 (1)
10. Regulation of water flows		82 (1)	195 (3)	44 (1)	121 (1)			620 (4)
11. Waste treatment	218 (1)	2,672 (28)	330 (4)			541 (2)		31 (4)
13. Maintenance of soil fertility		12,359 (1)				480 (8)		
14. Pollination						421 (9)		
15. Biological control						809 (14)		
16. Maintenance of life cycles		192 (10)		77 (1)				
17. Maintenance of genetic diversity		40 (1)	1,425 (2)					
18. Aesthetic information		713 (25)	525 (9)	942 (5)	35 (1)	17 (7)		35,036 (2)
19. Opportunities for recreation and tourism	2,340 (100)	3,470 (45)	12,292 (16)	2,322 (14)	809 (2)	7.05 (1)	1,742 (1)	1,766 (3)
20. Inspiration for culture, art and design		14 (14)	101 (18)	2,672 (5)		16 (16)		
22. Information for cognitive development		1,493 (14)	121 (3)	1,517 (4)	200 (1)		2,977 (2)	2,233 (4)
23. Existence, bequest values	49 (4)				1,882 (8)			
Sum	**2,587 (106)**	**31,847 (194)**	**25,982 (92)**	**20,158 (38)**	**2,830 (345)**	**4,729 (87)**	**122,746 (5)**	**54,069 (128)**

Table 2: Summary values of ecosystem services of various biome types/ecosystems from the ESVD for the UK, Ireland and the Netherlands in $ per hectare per year, including the count (n). Taken from esvd.net.

4.1.3 Integrated landscape-based management approaches

As mentioned in 1.3, landscape-based approaches are a common thread throughout the report. A specific type of a landscape approach is a catchment-based approach. This project, logically illustrated by the ENCA and INCASE initiatives, highlights the use of catchment-based approaches when discussing water-based ecosystems. However, the report refers more broadly to landscape-based approaches outside of the realm of water.

Of key importance in a catchment-based approach is to identify, locate and describe (the connection between) multiple ecosystems which are part of a catchment. Water by nature is mobile and originates from and flows through several different ecosystems before ultimately ending in the ocean. In the context of ES, measuring and valuing ES is therefore an important and difficult challenges for to water management because it has to account for various ecosystems in complex relation to various stakeholders, a difficulty also described by both ENCA and INCASE. The identification of ecosystems is equally important in a landscape-based approach.

Figure 4 is a simplified version of some main ecosystems related to a catchment. There are several stakeholders which are related to the ecosystems within catchment management, creating a complex net of actors which all benefit from and impact ES in various ways (see Annex 6, we elaborate on the different ecosystems referred to in figure 4).

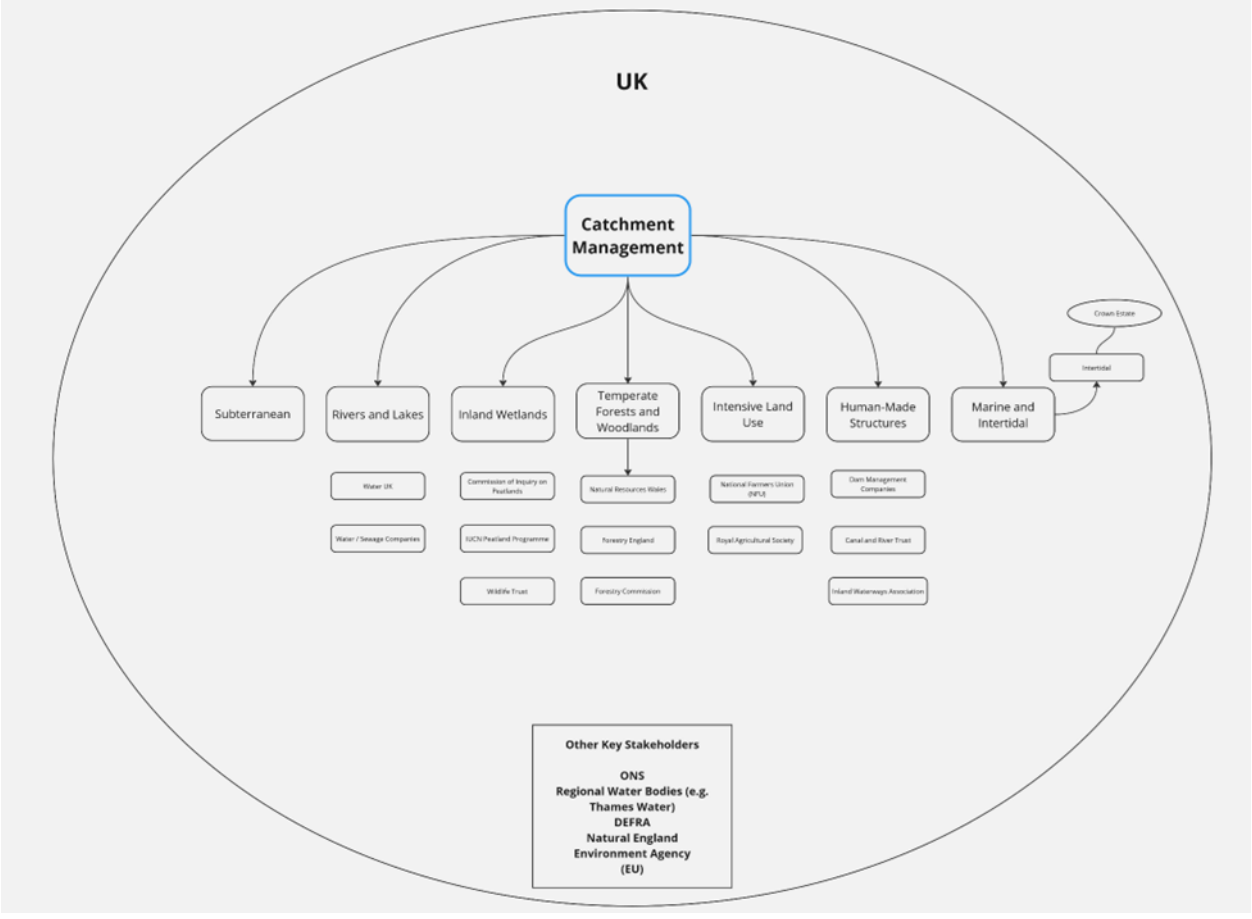

Figure 4: Different relevant ecosystems in a catchment and relevant stakeholders in the UK.

In a catchment-based approach, relevant ecosystems are identified and the further applying an ES valuation gives an insight in the value of different ES in the catchment and impacts on ES as a result of changes within the catchment. This in turn pinpoints to various stakeholders and the benefits they

receive. In a catchment where farmers upstream maintain the floodplains which increases capacity in case of storms or increased run-off, a drinking water company 20 km downstream benefits because the risk of flooding is lower and so are the costs of dealing with increased water flow such as clogging costs or costs to remove sediments.

Furthermore, taking a landscape-based approach as currently in the UK and Ireland is paramount because ecosystems and their services are mobile and should be seen in relation to each other and the effects they could have on different spatial scales, as shown in the example above. Relating this to the NBSAPs, it can be noted that the development of the NBSAPs should always be nested in a landscape approach and that NBSAPs should not be developed in isolation and per GBF target.

A landscape-based approach to ES shows the interconnectedness of and interaction between GBF targets and shows the relevance of ES to many GBF targets. In a catchment specifically, target 1 to manage areas to reduce biodiversity can benefit from ES valuation through showing the biodiversity and ES provided by different areas. ES also help in identifying the stakeholders that depend on or impact biodiversity. This information aids in prioritizing conservation and sustainable management efforts. Target 2 to restore degraded ecosystems can benefit from ES valuation by highlighting the economic importance of restoring water-related ecosystems by demonstrating the (future) benefits from ES such as water purification, protection against natural disasters and filtering of pollutants. Target 3 to conserve 30% of the world could benefit from ES through the identification of areas with high biodiversity and ES values, guiding the designation of water-related protected areas. The valuation also helps in identifying who the stakeholders are and gives direction on how to involve them in the conservation process. Target 10 to enhance biodiversity and sustainability in agriculture, aquaculture, fisheries, and forestry could benefit from ES valuation through the demonstration of economic benefits of sustainable land use practices, encouraging the adoption of biodiversity-friendly approaches in agriculture, aquaculture, fisheries, and forestry.

These targets interact with target 18; to reducing harmful subsidies by lowering pesticide use or polluted run-off, and target 19; to mobilize $200 billion of finance. Target 18 can benefit from ES valuation through the demonstration of the economic value of biodiversity to contribute to the reduction of harmful incentives and the scaling up of positive incentives while target 19 can benefit from the development of PES schemes (see section 4.2.2 for more information).

However, as described in 4.1.2, in the different natural capital data sets, there is a lack of data on all relevant ES in a catchment specifically for the UK and Ireland. This is an important gap to address, as failure to do so undermines the true value of ES that are taken for granted and subsequently undermines the development of innovative PES schemes.

For instance, in catchment-based approaches, agricultural ecosystems often play a pivotal role (as described in the example above). Agricultural activities, in particular, pose a significant threat to water quality and overall ecosystem health, which effects the provisioning of ES. Regulating ES of wetlands and other water-related ecosystems have the capacity to counteract some of these damages, but they are not always adequately covered in the ESVD. Therefore, there is a pressing need to shift attention towards regulating and supporting ES within catchments. Important regulating ES are buffers against storms and floodings and the filtering of pollutants. More data on these ES then provides better insights in the economic damages for societies after these ES are lost.

In conclusion, this chapter has shown the common challenges in water management as a result of global warming, habitat changes and pollution in the Netherlands, the UK and Ireland. By integrating an ES valuation approach, the benefits for societies of protecting, enabling and providing water-related resources become visible, which is highlighted by ENCA and INCASE initiatives. In the ESVD,

there is a wealth of data available which could complement some data gaps in ENCA and INCASE. Although the ESVD also has some data gaps, the standardized and structed approach to present the information could serve as an incentive to collect new data in the ESVD format in collaboration with ENCA and INCASE. There is an apparent gap for regulating, supporting and cultural ES, which usually provide benefits for societies at large and often only become visible in damage costs once they have been lost. Important also is that in relation to water challenges, but also in the broader sense, a landscape approach is key to sustainable manage our natural resources using ES. Ecosystems and their services are spatial and mobile and provide societal benefits beyond the scale of one ecosystem. Finally, we have shown the importance of ES for many GBF targets. This in combination with the insight that many GBF targets are interconnected shows the need for a frame which connects all targets with ES. The need which a landscape approach could fulfill.

A special place for NL2120, Vision for The Netherlands

Based upon a research project of Wageningen University & Research with the same name NL2120, a vision for the Netherlands in 2120 was created. It specifies opportunities for the economy, biodiversity and livability of the Netherlands. It is a new narrative for the Netherlands that gives leading roles to nature and natural processes. The story develops around the themes of water management, energy, agriculture, circular economy, urbanisation and biodiversity. By comprehensively approaching and analysing developments in these areas, the Netherlands can work towards environmentally positive, nature-inclusive solutions.

The choices that were made for the vision of the future in 2120 were based on five mutually reinforcing principles:

1. The natural system is the starting point.
2. Optimal use of water.
3. Nature-inclusive society.
4. Circular economy.
5. Adaptive spatial planning.

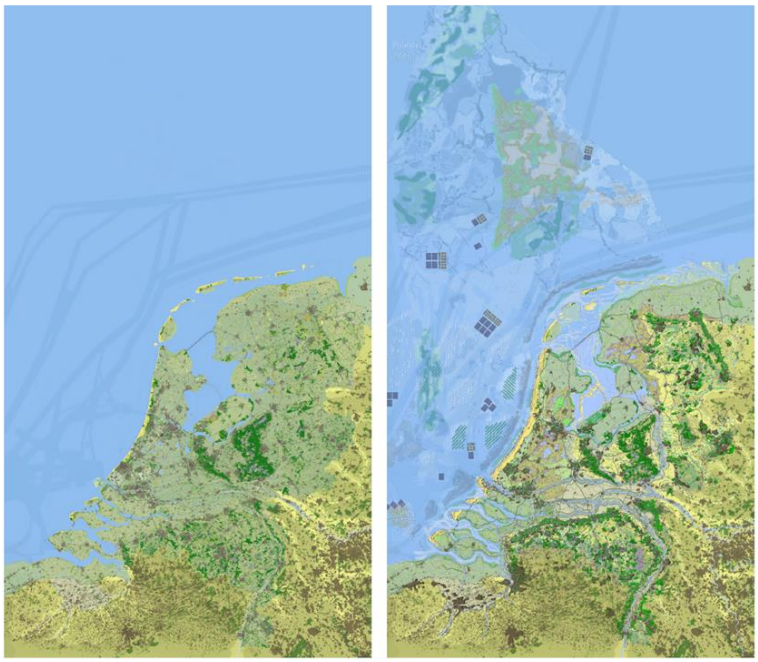

Figure 5: The map of the Netherlands in 2020 and the vision for the future in the Netherlands in 2120 (Baptist, van Hattum et al. 2019)

4.2 Financial opportunities: Painting the ES valuation picture.

In target 19 of the GBF framework, the need to mobilize both private and public finance is described to tackle the biodiversity funding gap. Additionally, target 18 describes the need to halt and reform perverse subsidies. These targets will be substantialized in the NBSAPs and they require next to the public also the financing capabilities of the private sector (Wolfs, 2023). To make the business case, insights on the opportunities for the financial sector have to be created. ES valuation could fit perfectly in this narrative. Building on the data overviews and the gaps observed in the various datasets, we spoke with several stakeholders (Contacted stakeholders list in Annex 7) to discuss the links between ES valuation and water management challenges.

Discussions on ES were sometimes abstract, and a struggle related to the uptake of ES valuation in a non-public setting was noted. In some meetings, the practical barriers related to the uptake of ES research and the barriers to make a persuasive business case were mentioned. We found that the application of a TEV and quantifying the impacts of different scenarios of ES fits well with the concept of Nature based Solutions (NbS) to make application of ES valuation less abstract. For example, a TEV calculation could be used to compare all relevant (also the non-marketable) ES of 'grey' investments with a green NbS scenario. This could assist in tackling the finance gap described in chapter 2.

Nature-based Solutions (NbS) is a concept which has seen large international attention in the past years. NbS encompasses a wide range of interventions that leverage the inherent capacity of ecosystems to provide solutions to various environmental and societal issues. NbS can include, among others, activities such as reforestation, green infrastructure development, and sustainable land management practices. According to IUCN (IUCN 2024) "NbS leverage nature and the power of healthy ecosystems to protect people, optimize infrastructure and safeguard a stable and biodiverse future". NbS can operate at different scales but are more commonly associated with localized interventions or projects that leverage natural processes to achieve specific goals. NbS often implicitly acknowledges ES, without always specifically mentioning the concept. Additionally, NbS only focuses on a limited number of ecosystem services provided by the intervention.

4.2.1 Quantifying Nature-based Solutions

As noted in 4.1.3, actions and strategies to conserve and restore nature often involve numerous stakeholders at different spatial scales such as governments (local, regional, national, international), businesses, NGO's, corporates, financial organisations, private individuals and others. Emphasizing the importance of nature through ES and highlighting that solutions to societal problems could find their roots in nature, potentially increases societal support. For example, air pollution causes approximately 7 million of premature deaths yearly[9], while trees up fine particles and therefore reduce the impacts of air pollution. Putting these benefits in monetary terms shows the enormous benefit of ES (see De Jong and van 't Hoff, 2023 for an example). NbS are known to provide many ES to a variety of different stakeholders (Pereira, 2023). But, the current inability to integrate regulating,

[9] https://www.who.int/health-topics/air-pollution

supporting and cultural ES, makes benefits of NbS invisible and inhibits the uptake of NbS in the design of the business case. A positive business case is fundamental for board buy-in[10].

Additionally, there are other challenges for the uptake of NbS in business. A recent report by the European Investment Bank (EIB, 2023) sheds light on the challenges hindering the scaling up of NbS. Among these challenges are the large transaction costs. These costs stem from the fact that NbS solutions have not reached the mainstream. The report emphasized the necessity for more real-world examples illustrating the implementation and adoption of NbS. Another challenge is a comprehensive understanding on the performance of NbS solutions (EIB, 2023). It is therefore vital to understand the their costs and benefits compared to grey 'business as usual' (BaU) solutions.

The valuation of ES provides a common language to discuss the impact and dependencies of all stakeholders on the benefits received from nature. Explicitly using economic valuation of ES can contribute to the uptake of NbS by providing insight in the contributions of nature to our societies and economies, looking at all relevant ES. This understanding enables stakeholders to assess the benefits of NbS and the risks associated with adhering to grey solutions. This insight then could lead to necessary changes in contract conditions and financial structures.

To achieve this, as mentioned before, there is the need to include additional values for ES. These ES, such as the protection against storms, show the benefits of natural ecosystems to prevent and minimize economic damages. These types of ES can be very valuable in risk management perspective which could draw attention of financial investments.

4.2.2 The development and scaling of innovative PES schemes

Building upon the preceding conclusions, a deeper understanding of the importance of ES and the intricacies of stakeholder impacts and dependencies on nature emerges. ES valuation assigns a monetary value to the benefits of nature and identifies relevant stakeholders who could receive payments for conservation of ES. Hence, data on the value of ES is key to the development of appropriate PES schemes for a nature-positive and financially viable business case.

PES schemes have been around decades and as of 2018, some 550 have been known to exist worldwide, but scaling has proved to be difficult (Salzman et al, 2018). Placing ES valuation into relatable terms, such as relating it to NbS and landscape approaches, could become useful in the context of designing successful PES mechanisms. Because PES mechanisms are generally applied on a landscape scale to be effective (Kissinger et al, 2013), a landscape-based approach fits well with PES schemes, specifically for connecting specific sectors and identifying ecosystems to the relevant stakeholders. Also, NbS provides a well-known framework in which PES and ES valuation are substantialized and be made less abstract. Additionally, vice versa, PES schemes can be a useful addition to NbS in a broader landscape approach because they identify relevant stakeholders and are derived from the perspective of the beneficiary[11].

Because PES schemes rely heavily on the engagement of affected parties for success, a broader set of economic values, but a broader set of values generally must be taken into account to ensure their success. Firstly, an ES valuation embedded in a valuation of a broader set of relational and intrinsic values, as highlighted by the IPBES Value Assessment (see figure 5), ensures a more comprehensive and effective approach to PES scheme development, with attention for local relevance, cultural factors and acceptance. It is relevant not only for the success of PES itself but even more so for the GBF goal "to halt and reverse biodiversity loss by 2030" (IPBES, 2022) and for the development of

[10] https://capitalscoalition.org/
[11] Green Growth That Works, Stanford Natural Capital project

NBSAPs. It is directly mentioned in target 11, to restore, maintain and enhance nature's contributions to people.

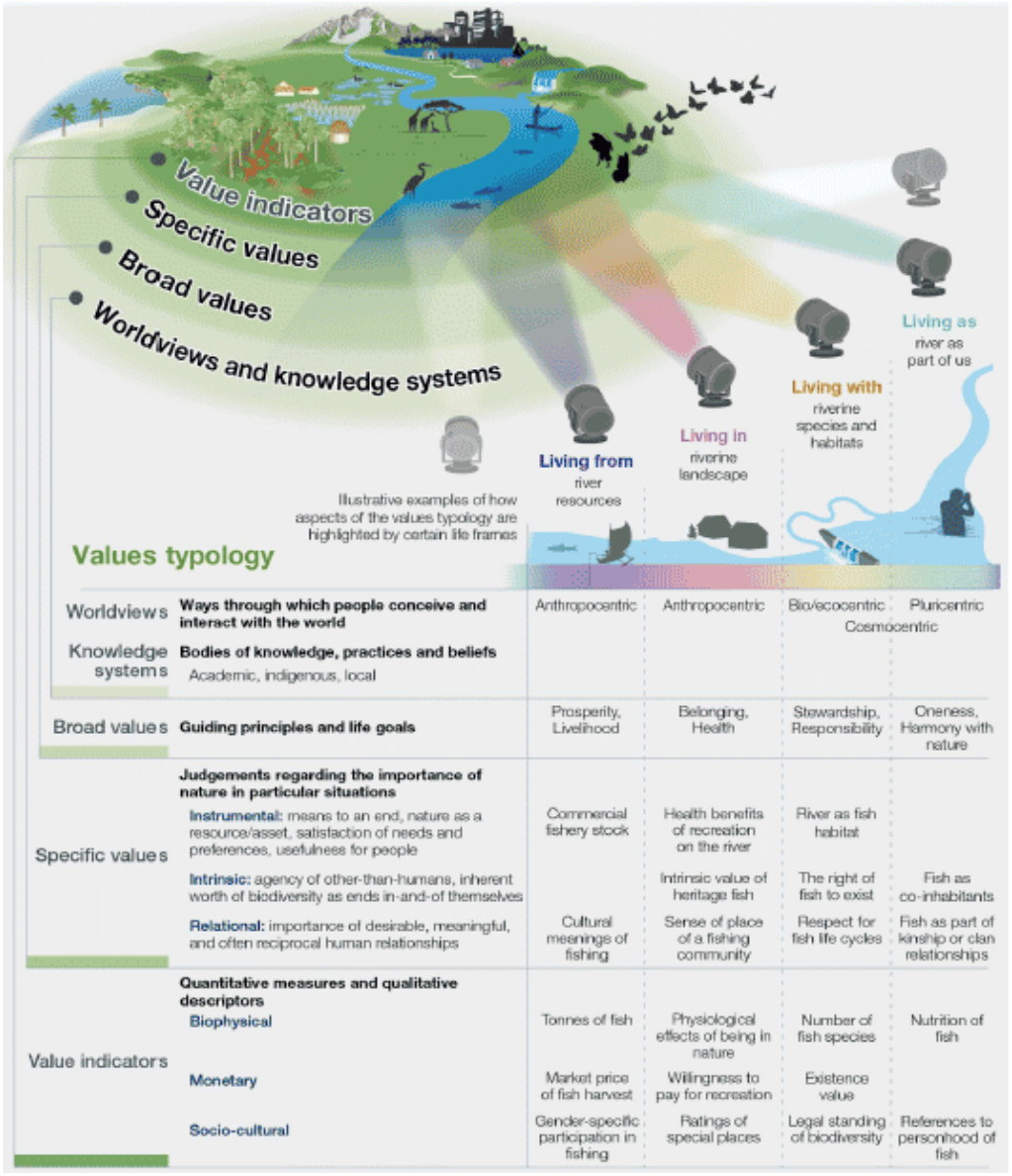

Figure 6: IPBES Diverse values and valuation of nature 2022

Secondly, the insight that all relevant ES should be included, and not only the marketable ones, is also relevant in several GBF targets such as target 2: Restore 30% of all degraded ecosystems. In order to achieve this target, we need ES valuation to highlight the economic importance of restoring ecosystems by demonstrating the (future) benefits accrued from restored services such as water purification, pollination, and carbon sequestration (For more information on the relevance of ES to the GBF see annex 1). PES Schemes play a crucial part to achieve success in reaching this target because they are crucial to provide financial incentives for landowners to participate in restoration efforts.

4.2.3 Mobilizing the private sector

As mentioned before, PES mechanisms are essential tools for redesigning the business case. The reigning paradigm is that an investment revolves around a large return on investment (ROI) while for other investments, with a lower (predicted) ROI, the public sector should partake. In discussions with

stakeholders, the question was raised on how to define value in the current economic system (what ROIs could look like when agreed on a broader set of values). A first brainstorm brought up thinking lines ranging from differentiating PES mechanisms to include carbon credits and marketable biodiversity credits to “polluters pay fees”. However, at the core of this thinking lies an understanding of the ecosystem and, the ES in relation to the stakeholders.

Target 7 of the GBF aims ‘to reduce pollution to levels that are not harmful to biodiversity’ and specifically mentions cumulative effects of pollution, including: (a) reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) preventing, reducing, and working towards eliminating plastic pollution. In discussions, it was highlighted that PES schemes fit well to develop an economically sound business case in support of Target 7 because ES can quantify the impact of pollution on biodiversity and ecosystem functions, providing a basis for setting targets to reduce pollution

Designing landscape-based PES schemes with an integrating ES valuation assessment, as described in 4.2.2, can support initiatives that reduce pollution by paying landowners for implementing practices that contribute to regulating ES such as improved water and air quality. Currently land owners receive a compensation payment for losses when integrating sustainable practices. Eliminating these kind of damage compensation subsidies would mean that many (agricultural) landowners lose a substantial part of their income. By replacing this subsidy with landscape-based PES schemes it could:

- Support reducing pollution levels (GBF target 7, see above for the link with ES) and,
- Maintain habitats that are crucial for threatened species (GBF target 4, see 4.1.3 for the complete link with ES). ES valuation could provide additional support from society as they become more aware of the (societal) importance of these species. Insights in the monetary value allows for a more just and clear cost-benefit analysis. It might make it more clear why it is worthwhile to invest in extra protection measures to prevent these conflicts.
- Restore wetlands that are needed to minimize the impacts of climate change (GBF target 8). ES and PES schemes can highlight the role of ecosystems in climate regulation and the provision of ES that contribute to climate change mitigation and adaptation. Understanding these services can guide strategies to minimize climate change impacts on biodiversity.

This changes the development of a business case because of direct payments for restoration. Another important, innovative consideration could be that improvement ecosystem health increases the capital appreciation or exit-value of the land once sold. Changing the business case is pivotal for addressing targets 18 and 19 of the GBF. Additionally, knowing the positive and negative impacts is very important for target 15 of the GBF, to assess, disclose and reduce biodiversity-related risks and negative impacts. Businesses can use ecosystem services assessments to understand their dependencies and impacts on biodiversity. This knowledge can inform strategies for reducing negative impacts and incorporating sustainable practices.

In conclusion, NbS is an important framework to substantialize the monetary valuation of all ES because it is a well-known concept to promote restoration, conservation and the integration of nature in decision-making. Vice versa, ES valuation can make the benefits of NbS very clear which can justify and increase support for its implementation. It is key that all ES are accounted for, also regulating, supporting and cultural ES which are often not accounted for. PES schemes fit well with NbS because they provide clear links to the beneficiaries and because they also provide a financing mechanism for implementing NbS. On the other hand, NbS provides a well-known framework for PES

schemes to operate in. NbS could provide a useful frame for PES schemes to be scaled-up and be used more frequently. PES scheme could not only improve ecosystem health, it could also present a viable business case because it create additional capital for landowners and because it could redirect existing public funding, which contributes to a more sustainable business case (GBF targets 18 and 19). This is important because a business case needs to demonstrate substantial ROI to attract financial investments. For more information on how PES schemes can be used for each specific target of the GBF we refer to Annex 1.

A special place for NL2120, Making Nature Count

Information on the monetary value of nature holds an important key to assure the successful implementation of the NL2120 program in different ways.

First of all, monetary valuation can showcase the benefits of NbS which could enable the further uptake of investments and incentivizing policies. It highlights that there are societal and economic benefits to NbS, beyond biodiversity benefits for different stakeholder types. This could strengthen support for NbS as it has societal and economic effects also.

It makes the value of nature very tangible, in a language we all understand, namely money. In the current political climate, where the importance of nature is not valued for its own sake, economic arguments on the societal benefits of NbS could be used to address the importance of nature policy makers and societal stakeholders. Insights into the current and potential future monetary value of nature and the different NbS could make clear that ES and their value should be incorporated in the development and planning of these NbS. It will help in assessing and optimizing societal and economic benefits.

4.3 Interest in knowledge sharing and collaboration across nations

A final objective was to promote cross-border knowledge exchange and cooperation in landscape restoration, nature-related financial decision-making and policy making and to explore the interest in a possible collaboration platform. The UK, Ireland and the Netherlands individually are all at the forefront in their thinking on ES and NbS. Discussions among stakeholders in the Netherlands, the United Kingdom, and Ireland reveal a collective eagerness for cross-national collaboration in advancing the application of ES valuation and the integrating with NbS. Although, ES, NbS and PES schemes are relevant for all ecosystems, there is a special interest in water-related ecosystems and biomes and therefore, we noted the following opportunities for cross national collaboration.

4.3.1 Enhancing understanding of ES valuation and increasing data density

We observe a strong increase in data, knowledge, tools, methodologies and interest on ES, NbS and PES schemes. This fits with the overall rapid development of ES throughout Europe and the good geographical representation of Europe in the ESVD. Currently, Europe accounts for the largest proportion of value estimates (32%). More specifically, 15% of the total corresponds to the UK, with 1,443 value estimates. This is by far the largest number of value estimates for one country on the ESVD (Annex 2) and large investments have been made in the three countries to collect ES data.

Although this is the case, ES data on water-related ecosystems is still relatively scarce and many more values could be included in the ESVD, capturing mainly regulating and cultural ES not captured by market dynamics. We have noticed this clear interest by the UK as well as by the Netherlands to further develop statistically sound non-market ES values. This view was taken from discussions with

the Dutch Natural Capital CoP, seminars with various DEFRA departments and a meeting with the Irish Business for Biodiversity platform. As described in Chapter 2, non-market values have always been difficult to integrate in our economic systems, but, there currently seems to be momentum to redefine economic value and include these values.

This fits with the data as presented by ENCA and INCASE. The ENCA ES databook for example reveals a focus on some ES over others (Office for National , 2022). The list of categories reveals a focus on agriculture, air pollution, carbon sequestration, fossil fuels, hedonic pricing, minerals, renewables, timber, tourism and recreation, urban cooling and water abstraction (See annex 4). This again highlights the importance of including all ES.

This is also one of the key take-away points of the Dasgupta review (Dasgupta 2021): The narrow view on design and measurement of natural capital remains in our current systems. To develop our understanding of the value of ecosystems and the services they provide to our societies and economy, we need a more comprehensive and extended view.

Furthermore, there is a clear need for more primary valuation studies and more sophisticated value transfer functions (see figure 7). Figure 7 shows the type of data used in the ENCA. As noted, the ENCA Databook falls short in relation to value transfer function and primary valuation data. Different levels of expertise are available within the three countries. Connecting the different experts on these topics and facilitating the application of their research on highlighting the benefits of NbS is one of the first steps towards building better integration of ES in policy making and more complete datasets.

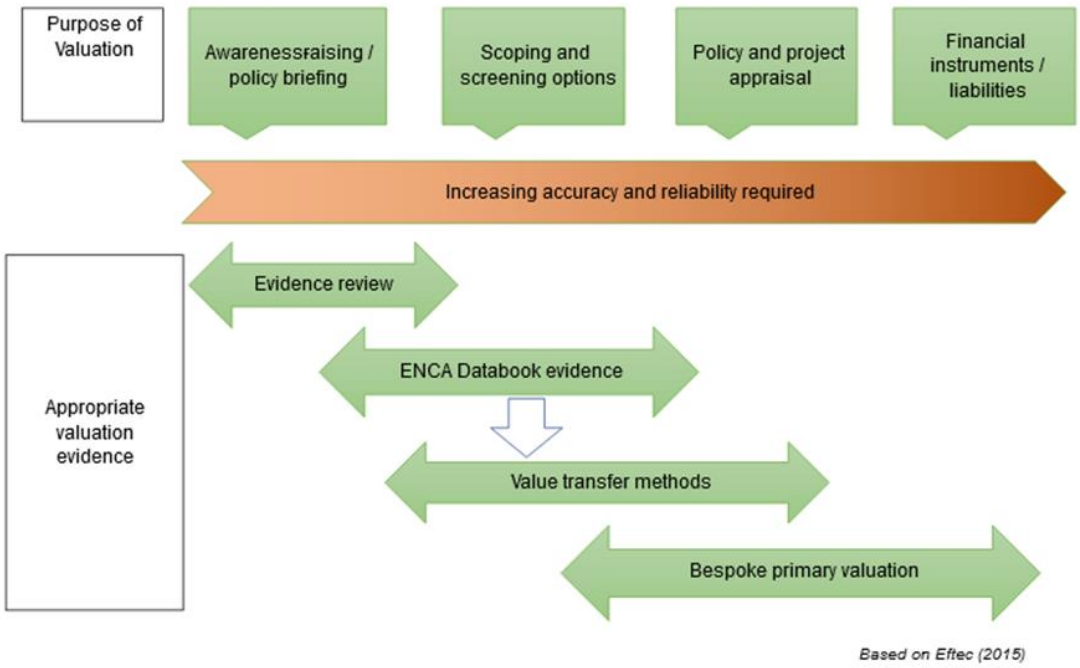

Figure 7: Demonstrating the need and place of uptake for primary valuation studies, Based on Eftec 2015

4.3.2 Potential platforms for cross national collaboration

Connecting experts and practitioners and exchanging knowledge can easily be facilitated through the network of ESP. ESP connects experts, practitioners and policymakers on the topic of ES. And while the UK, Ireland and the Netherlands do not yet have an official national network within the ESP structure, ESP can easily facilitate the development of a regional chapter for collaboration.

Additionally, the Thematic, Biome and Sectoral Working Groups also offer interesting opportunities for collaboration (see Annex 9, 10 and 11 for more information on the working groups).

Two other initiatives that we deem important to note here are the Business for Biodiversity platform, which is an initiative from the European Commission aiming to build momentum, created by the early adopters in business and their pioneering efforts to integrate biodiversity into business practices. They can play an important role in the design of catchment- and landscape-based PES schemes as their partners are often larger businesses with a strong local identity.

Another recommendable platform is the Partnership for Biodiversity Accounting Financials (PBAF). Within PBAF, there has been a working group on ES (valuation) and the integration in financial decision-making. In this context, a continuation of the working group could be designed to focus on the uptake of integrated ES valuation with a specific interest for water related ecosystems.

Below we provide some first contact suggestions to establishing an ESP National Network in both Ireland and the UK:

UK potential collaboration contacts (general):

- Economic For The Environment (Eftec), *a consultancy organisation working on NCA and economic valuation of ES in the UK.*
- Natural Environment Research Council (NERC) valuing nature network
- Natural Capital Committee (NCC)
- Catchment Based Approach. *A platform working together to improve the water environment.*
- The Environment and Sustainability Institute (ESI)
- UCL STEaPP, *during the course of this project we had several meetings with Carla Washbourne, associate professor at UCL STEaPP who expressed her interest to startup this group as representative from the UK*

UK potential collaboration contacts (specific biomes):

- Peatlands – IUCN UK Peatland Program
- Rivers and Lakes – Water UK, Water and Sewage Companies, Canal and River Trust, Environment Agency
- Forestry – Forestry commission, Eftec
- Marine – Centre for Ecology and Hydrology, Joint Nature Conservation Committee – Marine Natural Capital
- Human based systems – Water companies, waterways UK

Ireland potential collaboration contacts (general):

- Business for Biodiversity, *during the course of this project we had several meetings with Lucy Gaffney, Lead of the Irish Business for Biodiversity platform and who expressed her interest to connect to a cross-national Business for biodiversity working group.*
- Central Statistics Office - Ecosystem Accounts Division (EAD)
- National University of Ireland, *during the course of this project we had several meetings with Conor Kretsch, adjunct lecturer in ecosystems and human well-being who expressed his interest to start this collaboration from Ireland and connect the above mentioned institute*
- INCASE project
- EPA Catchments
- Natural Capital Ireland

Ireland potential collaboration contacts (specific biomes):

- Peatlands – Bord na Móna
- Intensive land use – Farming for Nature, BurrenLIFE, ACRES scheme

- Forestry – Coillte (ForES)
- Marine – Bord Iascaigh Mhara (BIM), Marine Institute, University of Galway
- Human Based systems - Uisce Éireann

4.3.3 Landscape-based approaches

Currently, The Netherlands is developing different policies for urban and rural landscapes and some policies take small steps in the development of landscape approaches, but there is still a way to go. The common water-related issues as shown in chapter 4.1, the mutual interest in NbS and the catchment-based approaches developed by the UK and Ireland clearly show the mutual importance of collaboration. At the same time, UK and Ireland benefit from ESP network and data and expertise developed by the ESVD The monetary valuation of ES be used as a tool to show the benefits of NbS and pinpoints towards payment schemes and stakeholder involvement. Learning how the UK and Ireland have developed these catchment-based approaches and what they have learned throughout the years has the potential to be pivoting information for the Netherlands.

To successfully reach the GBF targets, the development of the NBSAPs will require a large collaborative effort of the sciences with public and private decision-making. Making use of best practices throughout and fostering collaboration between the Netherlands, the UK and Ireland on the development of NbS, ES valuation and integrated landscape approaches is pivotal. In this chapter again, we have seen the interconnectedness between the different GBF targets. Approaching the targets and their national implementation via the NBSAPs through a landscape approach is key to strengthen and ensure not only the ecological, but also the social and economic dynamics are accounted for. Biodiversity is local and complex, and so are the interrelated social and economic dynamics. Support from private finance is essential and therefore using a landscape approach and monetizing the benefits of NbS via ES can result in innovative PES schemes grounded in local and national contexts.

A special place for NL2120, Integrated catchment based Management approaches

In recent years, NbS have become part of international treaties, such as the European Green Deal and the GBF. Well-known examples in the Netherlands are coastal reinforcement with sand, and city parks for water collection and cooling. The NL2120 knowledge program focuses, among other things, on subsidence areas. In Friesland, the consortium will be experimenting in a 105-hectare innovation polder where the water level will be raised. The aim is to slow down subsidence and to halt large amount of greenhouse gases that are emitted as a result. It is an example of concrete solutions that should lead to new, future-proof and economically viable forms of land use. Pilots are underway in the Rotterdam-Dordrecht region with tidal parks, in which hard banks have been replaced by gradually sloping green banks. The influence of ebb and flow returns, which contributes to biodiversity. Another focus is the increase of greenery in the city, which increases the quality of life and reduces heat stress on hot days. They are all examples of natural solutions for concrete challenges that can really make a difference.

NL2120 can offer a “safe” place to test and adapt a landscape-based approach to Dutch standards. Including landscape-based ES assessments and stakeholder involvement raises the chance on successful results within NL2120.

5 Conclusions

In this project commissioned by RVO, FSD researched potential collaborations aiming to enhance decision-making processes and promote sustainable development across the United Kingdom, the Netherlands and Ireland. The main objective was to explore opportunities for knowledge exchange and sharing potential policy actions in the field of monetary valuation of ES, the development of NbS and landscape-based approaches and their usability within the context of the GBF and the NBSAPs.

Through the analysis of ES valuation data in the ESVD, ENCA and INCASE and stakeholder meetings in various forms gaps and opportunities for collaboration capacity building related to monetary valuation were researched. This led to an initial first description of the connection between the monetary valuation of ES, landscape-based approaches related to water challenges and NbS for the development of innovative PES schemes, all in the context of the GBF and the NBSAPs.

Results from the meetings with experts indicated that one of several shared challenges of the Netherlands, the United Kingdom and Ireland related to many GBF targets is to adapt to and mitigate the effects of global warming in the context of water management for creating resilient and thriving societies and nature. The three countries share water-related challenges in terms of scarcity, abundance and dependency of and availability and access to water of both nature and societies.

Additionally, this project has brought valuable insights and opportunities regarding the monetary valuation of ES in the context of water management. The analysis of ENCA, INCASE, and NL2120 has highlighted the critical need for more comprehensive data focusing on ES values for marine and other water-related ecosystems and for including data on regulating, supporting and cultural ES, beyond only provisioning ES to account for and integrate the full value of nature. The ESVD, with its wealth of data, is a good starting point for collaboration by addressing this data gap. Of special importance in this report are regulating ES which for example protect economies and societies against natural disasters and which filter pollutants. These ES often become only visible once lost, hence adequate insights in their monetary value can form a basis for protection and conservation of nature.

Large challenges are the GBF targets to mobilize $200 billion for the restoration and to tackle harmful subsidies. Having information on all the benefits of nature to societies and economies is imperative for designing and scaling-up PES schemes and incentivizing new financing mechanisms to reach the targets. Embedding PES schemes within landscape approaches sheds light on the large importance of regulating ES, and PES schemes link those who benefit and those who safeguard these ES. Payment for protection of these ES can incentivize the mobilization of private investments to develop economically and ecologically sound business cases for NbS. In building a business case, showing the TEV of all ES in a NbS scenario compared to the ES in a grey scenario is useful because it has the potential to shift the narrative that investing in nature lacks financial returns.

Moreover, many GBF targets are connected and ES valuation is beneficial to address many targets. This indicates the need for an overarching framework to embed both ES valuation and the GBF targets. A need that can be addressed by applying a landscape approach. Hence, the NBSAPs should not be developed per GBF target, but should be developed holistically in a landscape approach.

Finally, data is important, but it is far from all. Fostering collaboration and trust is as important, if not more. We are all aware of the dire need to reform our current economic practices, but this requires a viable alternative, combined efforts and the space to develop, experiment and cocreate. The ESP network, PBAF and the Business for Biodiversity platform can all accommodate knowledge sharing between the three countries. Not the current state of nature started is crucial, but the state of nature when we leave and the type of nature we leave behind for next generation is!

A special place for NL2120, Integrating ES Valuation to yield success

The NL2120 project has a clearly distinct, more future looking, approach than ENCA and INCASE. Monetary valuation of ES helps in better assessing the benefits of NbS, attracting investments, and incentivizing the diversity of stakeholders involved like governmental organisations, businesses, financial organisations and the general public. It communicates the broader benefits of NbS to societies and economies, offering a tangible perspective in economic terms. In a political climate where the importance of nature may not be fully recognized, economic arguments based on the societal benefits of NbS can be influential. Furthermore, insights into the current and potential future monetary value of nature assist in incorporating ES into the development and planning of NbS, including suitable PES schemes, optimizing NL2120 to deliver on its success.

6 Recommendations for policymakers

6.1 Prioritizing water management

In the report, we showed that water is a common denominator between the three countries and that it is one of the most urgent challenges to address in relation to climate adaptation. Specific policy recommendations for the Netherlands would be:

- To prioritize collaborative efforts with neighboring countries, such as, but not restricted to, the United Kingdom and Ireland, to address and share water management issues and best practices. This collaborative approach will not only strengthen resilience against flooding, but also promote sustainable water management practices across borders, safeguarding water resources and enhancing public welfare.

- To prioritize research and data collection efforts for ecosystem services (ES) specifically focused on water-related ecosystems. This could include initiatives to enhance the monitoring and valuation of ES associated with rivers, lakes, marine environments and other relevant catchment ecosystems such as wetlands. Investing in doing studies to address the full range of ES provided by these water-related ecosystems, including those ecosystem services currently lacking monetary value estimates such as waste treatment, protection against storms and biological control, would be essential.

- To adopt similar landscape-based strategies for water management as in the UK and Ireland. This involves the integration of multiple ecosystems within catchment areas and the recognition of their interconnectedness in providing ES. The Netherlands could prioritize the development of comprehensive natural capital assessments that encompass all relevant ecosystems and the services they provide for the health of an entire catchment. By bridging the gap between different ecosystems and their associated services, policymakers can gain a more holistic understanding of catchment management, facilitating the development of innovative Payment for Ecosystem Services (PES) schemes tailored to address water-related challenges effectively.

6.2 Integrating ES valuation in landscape finance for financial opportunities

The stakeholder consultations in this project revealed a disconnect between the abstract nature of ES value estimates and their practical application, particularly in non-public settings. Stakeholders emphasized the necessity of translating these abstract estimates into relatable terms to make persuasive cases for sustainable development with an eye for nature, such as comparing the Total Economic Value (TEV) of ES of "grey" investments and investments in Nature-based Solutions (NbS). This sparks interest in quantifying the impact of NbS through ES valuation, raising questions about their potential to form economically and ecologically sound business cases. Building from these insights we offer the following policy recommendations:

- Invest in the collection of regulating, supporting and cultural ES value estimates, with a particular interest on avoided damage costs and replacement costs. By incorporating these estimates into decision-making processes, policymakers can better assess the economic viability of NbS compared to Business-As-Usual (BAU) solutions and can create payment pathways to protection of nature and her ES.

- Extend the statistical natural capital accounts to encompass a broader set of ES values, as emphasized by the IPBES Value Assessment. This expansion will illuminate stakeholders and enhance the engagement of affected parties, crucial for the success of PES mechanisms. Collaboration with

relevant government departments like the statistics offices from different countries, should be intensified to also include ES values beyond their market prices as directly observed in economies.

- Recognize the crucial role of landscape-based approaches and PES schemes in the National Biodiversity Strategy Action Plans (NBSAPs). By taking a landscape-based approach and by integrating ES valuation and PES mechanisms into the NBSAPs, the Netherlands can contribute significantly to halting and reversing biodiversity loss, enhancing biodiversity, ecosystem functions, and services, and achieving ecological integrity and connectivity as outlined in the Global Biodiversity Framework (GBF).

- Develop and implement landscape-based PES schemes in the Netherlands, integrating ES valuation to support the reduction of pollution levels as outlined in Target 7 of the GBF. PES schemes have the potential to compensate landowners for implementing practices that enhance water and air quality, replacing existing damage-compensation subsidies. By aligning with ES values, the scheme can contribute to achieving GBF targets while creating additional capital value for landowners and fostering sustainable business practices.

6.3 Scaling up via cross national collaborations

In line with the objective to promote cross-border knowledge exchange and cooperation within policy making, our analysis yielded one strong policy belief. The Netherlands, the United Kingdom, and Ireland each exhibit advanced thinking regarding ES and NbS, which leads us to our final policy recommendation:

Establish a cross-border knowledge exchange program focused on landscape- and catchment-based approaches, inviting experts and practitioners from the UK, Ireland, and the Netherlands to share experiences, lessons learned, and best practices. This program should include workshops, seminars, and field visits to facilitate direct interactions and knowledge transfer. Additionally, create a dedicated online platform or resource center to centralize information, to do case studies, and to develop tools related to landscape-based management, accessible to stakeholders in all three countries. This initiative will enable the Netherlands to learn from the experiences of the UK and Ireland, enhancing its capacity to develop and implement effective policies for integrated landscape management and NbS.

Concluding Remarks

We extend our gratitude to the Dutch Enterprise Agency (RVO) generally and Caroline van Leenders specifically for entrusting us with this project.

The current era demands swift adaptation to evolving circumstances, and the unprecedented changes unfolding in our own natural environment underscore this urgency. It is easy to feel discomfort and withdraw into familiar spaces, retreating behind barriers, especially amidst pervasive polarization in today's world. However, projects like this one aim for the opposite—to explore our common ground, identify openings for collaboration, and are particularly relevant and immense in today's context.

Engaging in this exploration revealed far more than anticipated, as our researchers experienced firsthand. A plethora of reports and databases was sifted through, stakeholder lists meticulously created, a series of discussions, presentations and seminars with a diverse array of these stakeholders was undertaken. The insights and recommendations from all this work, have been summarized here. This report signifies that the time is ripe to extend and leverage the science of monetary valuation of ecosystem services, that Nature-Based Solutions stand as the most promising entry point to do this and that there is a substantial collective drive for such a collaboration in order to exponentially learn in the coming years.

It is through these collaborations that we can adapt to climate change and build a healthier future.

Wageningen, March 2024

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8 Annex

1. Overview of ES application possibilities in the context of GBF targets
2. Overview ESVD datapoints UK, British Overseas Territories and Ireland
3. Summary statistics of monetary value of ES
4. Overview and analysis ENCA Natural Capital database
5. Overview and analysis INCASE project
6. Ecosystem and Stakeholder list UK and Ireland according to Catchment design
7. Contacted stakeholders list
8. Overview how ES valuation can support PES schemes
9. Structured overview of Regional chapters and National networks ESP

8.1 Overview of ES application possibilities in the context of the GBF targets

One of our objectives was to identify how monetary valuation of ecosystem services can help governments to meet the targets outlined in the Kunming-Montreal Global Biodiversity Framework[12]. Below, we explain how both the concepts ES and PES Schemes align with all 23 targets. The text in italic is obtained from the GBF.

Target 1: Plan and manage all areas to reduce biodiversity loss

Ensure that all areas are under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes addressing land- and sea-use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.

- ES: Ecosystem services assessments can inform participatory and integrated spatial planning processes by highlighting the biodiversity and ecological services provided by different areas. They also help in identifying the stakeholders that depend on or impact biodiversity. This information aids in prioritizing conservation and sustainable management efforts.

Target 2: Restore 30% of all degraded ecosystems

Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.

- ES: Ecosystem services valuation can highlight the economic importance of restoring ecosystems by demonstrating the (future) benefits accrued from restored services such as water purification, pollination, and carbon sequestration. This allows for a more inclusive cost-benefit assessment of the restoration actions that are needed. It will also show that even degraded ecosystems provide a wide range of ecosystem services.

Target 3: Conserve 30% of land, water, and seas

Ensure and enable that by 2030 at least 30 per cent of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative,

[12] https://www.cbd.int/gbf/targets/

well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories.

- ES: Ecosystem services valuation can help identify areas with high biodiversity and ecosystem service values, guiding the designation of protected areas. The valuation also helps in identifying who the stakeholders are and gives direction on how to involve them in the conservation process.

Target 4: Halt species extinction, protect genetic diversity, and manage human-wildlife conflicts

Ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.

- ES: Recognizing the role of biodiversity in providing ecosystem services, its conservation contributes to maintaining the functioning of ecosystems, which is crucial for sustaining genetic diversity and reducing human-wildlife conflicts. The valuation could provide additional support from society as they become more aware of the (societal) importance of these species. It is, however, also important to identify the disservices of biodiversity, especially in the cases of human-wildlife conflict. Insight in the monetary value allows for a more just and clear cost-benefit analysis. It might make it more clear why it is worthwhile to invest in extra protection measures to prevent these conflicts.

Target 5: Ensure sustainable, safe and legal harvesting and trade of wild species

Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spillover, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities.

- ES: Sustainable harvesting practices can be guided by understanding the ecosystem services provided by the species. Ecosystem services assessments can inform the development of guidelines for sustainable use. Valuation of the ES shows that many stakeholders in other regions and countries financially benefit from certain resources without properly paying for it.

Target 6: Reduce the introduction of invasive alien species by 50% and minimize their impact

Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 per

cent by 2030, and eradicating or controlling invasive alien species, especially in priority sites, such as islands.

- ES: Understanding the impacts of invasive species on ecosystem services can inform strategies to minimize their negative effects on biodiversity and ecosystem functions. The insight will also help in getting societal support for the measures needed to reduce introduction and eradication of species. It will allow to make a better cost-benefit analysis that will support implementation of measures. Furthermore, it will help to identify who has a stake in the issue of invasive species.

Target 7: Reduce pollution to levels that are not harmful to biodiversity

Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.

- ES: Assessments of ecosystem services can quantify the impact of pollution on biodiversity and ecosystem functions, providing a basis for setting targets to reduce pollution.

Target 8: Minimize the impacts of climate change on biodiversity and build resilience
Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.

- ES: Ecosystem services assessments can highlight the role of ecosystems in climate regulation and the provision of services that contribute to climate change mitigation and adaptation. Understanding these services can guide strategies to minimize climate change impacts on biodiversity.

Target 9: Manage wild species sustainably to benefit people

Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.

- ES: Ecosystem services assessments can inform sustainable management practices for wild species by identifying the ecosystem services provided by these species and the impacts of their sustainable use.

Target 10: Enhance biodiversity and sustainability in agriculture, aquaculture, fisheries, and forestry

Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and

other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.

- ES: Ecosystem services valuation can demonstrate the economic benefits of sustainable land use practices, encouraging the adoption of biodiversity-friendly approaches in agriculture, aquaculture, fisheries, and forestry.

Target 11: Restore, maintain and enhance nature's contributions to people

Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature.

- ES: Ecosystem services valuation can highlight the importance of intact ecosystems in providing essential services to communities, such as clean water, fertile soil, and climate regulation.

Target 12: Enhance green spaces and urban planning for human well-being and biodiversity

Significantly increase the area and quality, and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature, and contributing to inclusive and sustainable urbanization and to the provision of ecosystem functions and services.

- ES: Ecosystem services valuation can demonstrate the value of green spaces in urban areas by quantifying the benefits they provide, such as improved air quality, mental health, and recreational opportunities.

Target 13: Increase the sharing of benefits from genetic resources, digital sequence information and traditional knowledge

Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic resources, and facilitating appropriate access to genetic resources, and by 2030, facilitating a significant increase of the benefits shared, in accordance with applicable international access and benefit-sharing instruments.

- ES: Recognizing the value of genetic resources and traditional knowledge in supporting ecosystem services can guide equitable sharing arrangements.

Target 14: Integrate biodiversity in decision-making at every level

Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on

biodiversity, progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of this framework.

- ES: ES valuation provides a practical tool for integrating biodiversity considerations into decision-making processes, offering a quantitative basis for policy development and land-use planning.

Target 15: Businesses assess, disclose and reduce biodiversity-related risks and negative impacts

Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:

(a) Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains, and portfolios;
(b) Provide information needed to consumers to promote sustainable consumption patterns;
(c) Report on compliance with access and benefit-sharing regulations and measures, as applicable;

in order to progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity-related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production.

- ES: Businesses can use ecosystem services assessments to understand their dependencies and impacts on biodiversity. This knowledge can inform strategies for reducing negative impacts and incorporating sustainable practices.

Target 16: Enable sustainable consumption choices to reduce waste and overconsumption

Ensure that people are encouraged and enabled to make sustainable consumption choices, including by establishing supportive policy, legislative or regulatory frameworks, improving education and access to relevant and accurate information and alternatives, and by 2030, reduce the global footprint of consumption in an equitable manner, including through halving global food waste, significantly reducing overconsumption and substantially reducing waste generation, in order for all people to live well in harmony with Mother Earth.

- ES: Ecosystem services assessments can highlight the environmental impact of consumption patterns, helping to identify areas for reducing waste and overconsumption.

Target 17: Strengthen biosafety and distribute the benefits of biotechnology

Establish, strengthen capacity for, and implement in all countries, biosafety measures as set out in Article 8(g) of the Convention on Biological Diversity and measures for the handling of biotechnology and distribution of its benefits as set out in Article 19 of the Convention.

- ES: Understanding the potential impacts of biotechnology on ecosystems and biodiversity can guide the development of biosafety measures that protect ecosystem services.

Target 18: Reduce harmful incentives by at least $500 billion per year, and scale up positive incentives for biodiversity

Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least $500 billion per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.

- ES: Demonstrating the economic value of biodiversity through ecosystem services assessments can contribute to the reduction of harmful incentives and the scaling up of positive incentives.

Target 19: Mobilize $200 billion per year for biodiversity from all sources including $30 billion through international finance

Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least $200 billion per year by 2030, including by:

1. *Increasing total biodiversity related international financial resources from developed countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least $20 billion per year by 2025, and to at least $30 billion per year by 2030;*
2. *Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;*
3. *Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;*
4. *Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms, with environmental and social safeguards;*
5. *Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises;*
6. *Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions[1] and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity;*
7. *Enhancing the effectiveness, efficiency and transparency of resource provision and use;*

- ES: Ecosystem services valuation can attract financial resources by showcasing the economic value of biodiversity and the services it provides.

Target 20: Strengthen capacity-building, technology transfer, and scientific and technical cooperation for biodiversity

Strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation, including through South-South, North-South and triangular cooperation, to meet the needs for effective implementation, particularly in developing countries, fostering joint technology development and joint scientific research programmes for the conservation and sustainable use of biodiversity and

strengthening scientific research and monitoring capacities, commensurate with the ambition of the goals and targets of the Framework.

- ES: Ecosystem services assessments can contribute to capacity-building by enhancing the understanding of the linkages between biodiversity and human well-being.

Target 21: Ensure that knowledge is available and accessible to guide biodiversity action

Ensure that the best available data, information and knowledge are accessible to decision makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent,[2] in accordance with national legislation.

- ES: Ecosystem services assessments provide valuable knowledge that can guide biodiversity action by offering insights into the contributions of ecosystems to human well-being.

Target 22: Ensure participation in decision-making and access to justice and information related to biodiversity for all

Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge, as well as by women and girls, children and youth, and persons with disabilities and ensure the full protection of environmental human rights defenders.

- ES: Ecosystem services assessments can empower local communities and stakeholders by providing information on the benefits of biodiversity, fostering inclusive decision-making.

Target 23: Ensure gender equality and a gender-responsive approach for biodiversity action

Ensure gender equality in the implementation of the Framework through a gender-responsive approach, where all women and girls have equal opportunity and capacity to contribute to the three objectives of the Convention, including by recognizing their equal rights and access to land and natural resources and their full, equitable, meaningful and informed participation and leadership at all levels of action, engagement, policy and decision-making related to biodiversity.

- ES: Ecosystem services assessments can incorporate gender perspectives by recognizing and valuing the roles that women play in sustaining ecosystems and biodiversity.

8.2 Overview ESVD datapoints UK, British Overseas Territories and Ireland

Currently, Europe accounts for the largest proportion of value estimates (32%). More specifically, 15% of the total corresponds to the UK, with 1443 value estimates. This is by far the largest number of value estimates for one country on the ESVD (see table 3). However, although Ireland is within Europe, there are only 12 value estimates, totalling 0.12% of all ESVD value estimates (as of October 2023). We note that this geographic distribution is partially determined by availability of valuation studies, but also by the regional interests of the organizations funding the development of the

ESVD. The British Overseas Territories have 36 value estimates, accounting for 0.36% of the total value estimates in the ESVD (see section 2.3 below).

Table 3: Top 5 Countries with the highest value estimates within ESVD

Country	**Number of value estimates**
United Kingdom of Great Britain & Northern Ireland	1443
United States of America	649
Netherlands, Kingdom of the	612
Brazil, Federative Republic of	464
China, People's Republic of	451

The United Kingdom

As previously stated, the ESVD already possesses a significant number of value estimates for the UK (n=1443) from approximately 118 studies. The map below shows the spatial distribution of value estimate study sites throughout the UK (see figure 8). There is naturally a fairly large concentration of studies around urban centres, where it is often easier to collect data due to proximity to universities and offices, and an easy location to focus for national studies. This may also be due to one EFTEC and Center for Ecology and Hydrology study (2019) in the ESVD comprising of 364 value estimates on the removal of air pollutants by vegetation in an urban area. There are other studies with a significant number of value estimates which affect the data, including Kenter et al. (2013) with 133 value estimates relating to the recreational value of marine protected areas to divers and anglers in the UK. There are also higher concentrations around areas with significant environmental sciences universities (see University of East Anglia just north-east of London on the coast) and areas of significant historical interest in the UK that are frequently studied (e.g. Jurassic coast). In national studies, there would also be a natural gravitation towards important urban or ecological centres when conducting analyses, depending on the topic. This leaves some room for including more value estimates outside of these urban centres, where data is often easier to find.

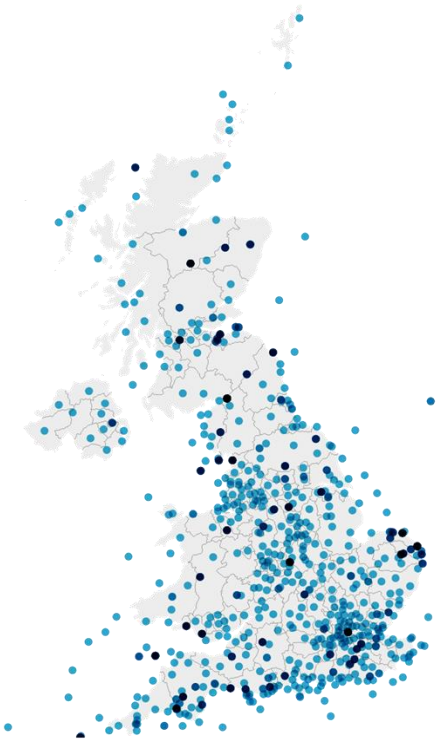


Figure 8: Spatial distribution of UK study sites in the ESVD

The scale at which the studies were conducted were as follows: 53% of the value estimates are at a local scale, 31% national and 16% sub-national (see figure 9). This means that most value estimates were acquired at a local level.

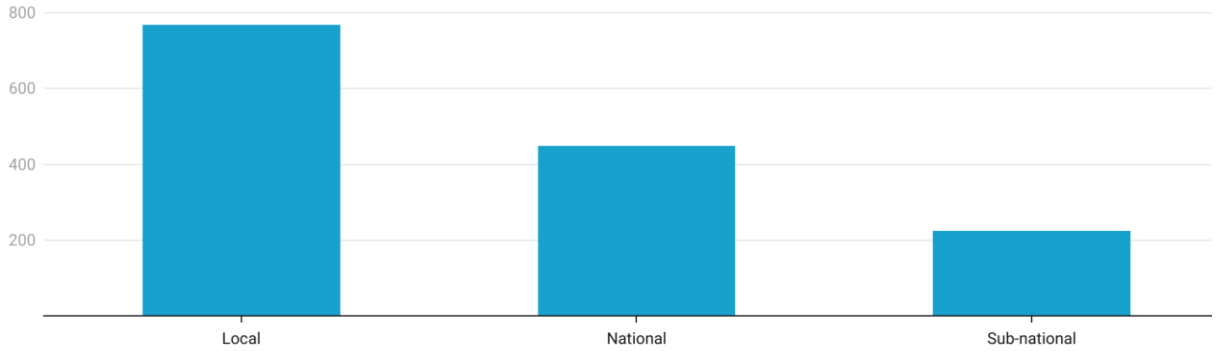


Figure 9: Study Location scale of UK study sites in the ESVD

*Figure 10*10 below depicts the number of value estimates per biome, with temperate forests being the largest at 27%. This is far higher than the second highest biome analysed, marine biomes at 11%. All 364 of 393 value estimates from temperate forests are from one study (Eftec and Centre for Ecology and Hydrology 2019). Rivers and lakes stand at 11%, urban and industrial areas at 10%, intensive land use at 9% and wetlands at 7%. Coastal systems represent 6% of biomes, and shrublands 4%, rounding out the largest biome categories with value estimates in the ESVD.

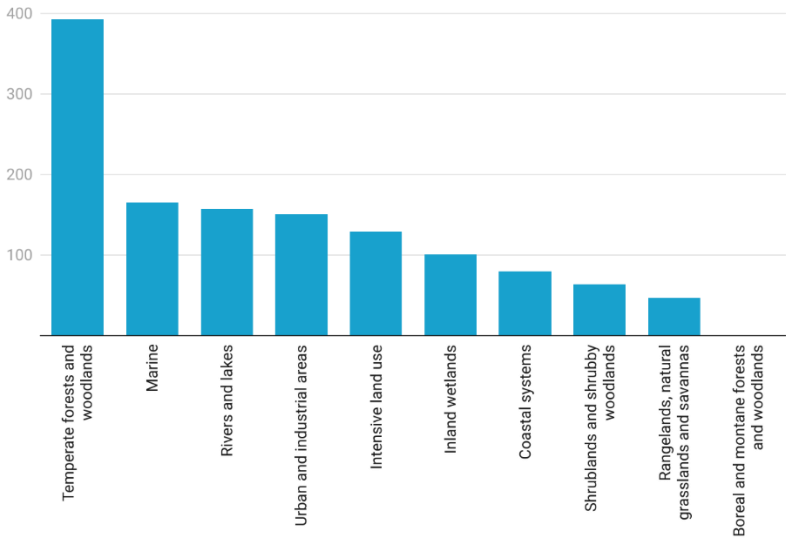


Figure 10: Number of value estimates in the UK per biome in the ESVD

When analysing value estimates per ecosystem (see figure 11), temperate deciduous forests stand out amongst the rest at 26% of value estimates for the UK, all of which are from the Eftec study (Eftec and Centre for Ecology and Hydrology 2019). As the study also looks at the effects of vegetation in urban areas, it also partially explains the high density of studies in urban areas. The next biggest share of value estimates are shelf sea and coral reefs at 12%, urban green and blue infrastructure at 11% and marshes and swamps at 7%. 133 of 165 (81%) marine value estimates, and 105 of 168 (63%) shelf sea and coral reefs value estimates are from Kenter et al. (2013). Rivers and streams (5%), sown pastures & fields (5%), cool temperate heathlands (5%) and temperate sub-humid grasslands (4%) represent the next largest categories, with quantities subsequently dropping off after.

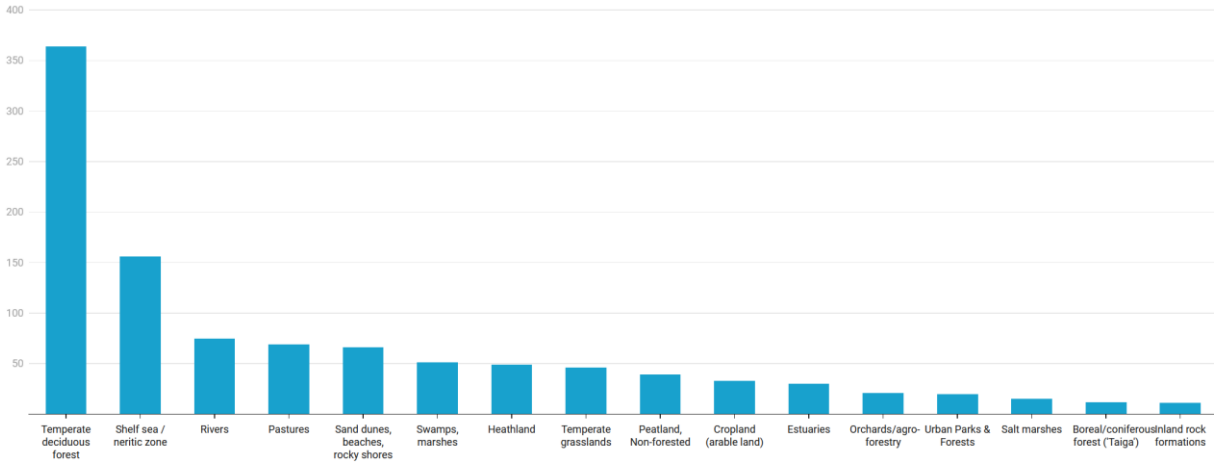


Figure 11: Value estimate quantities in ESVD per ecosystem (UK)

Figure 12 depicts the value estimate quantities per ecosystem service. Air quality and recreation/tourism are dominant at 31% and 29% respectively. This is once again largely due to a large amount of data from particular studies for air quality regulation (Eftec and Centre for Ecology and Hydrology 2019) and Kenter et al. (2013) providing almost half the value estimates for recreation/tourism. The remainder of the value estimates are quite evenly distributed across several ecosystem services types. There is quite a significant amount of data relating to cultural ecosystem services (e.g. aesthetic information at 6%, inspiration for culture, art and design at 6% and existence,

bequest values at 3%, and information for cognitive development at 2%) on top of the 29% recreation/tourism value, totalling 46% of ecosystem services analysed.

Regulating services also take up a sizable amount of value estimates, with climate regulation the third largest at 6%, alongside moderation of extreme events at 3%, maintenance of soil fertility at 2% and regulation of water flows at 1%. This brings the total to approximately 12% for regulating services.

Provisioning services has low representation for the UK compared to other ecosystem service types and other countries. This includes food at 5%, raw materials at 3%. This gives a total representation of approximately 8% for provisioning services in the UK.

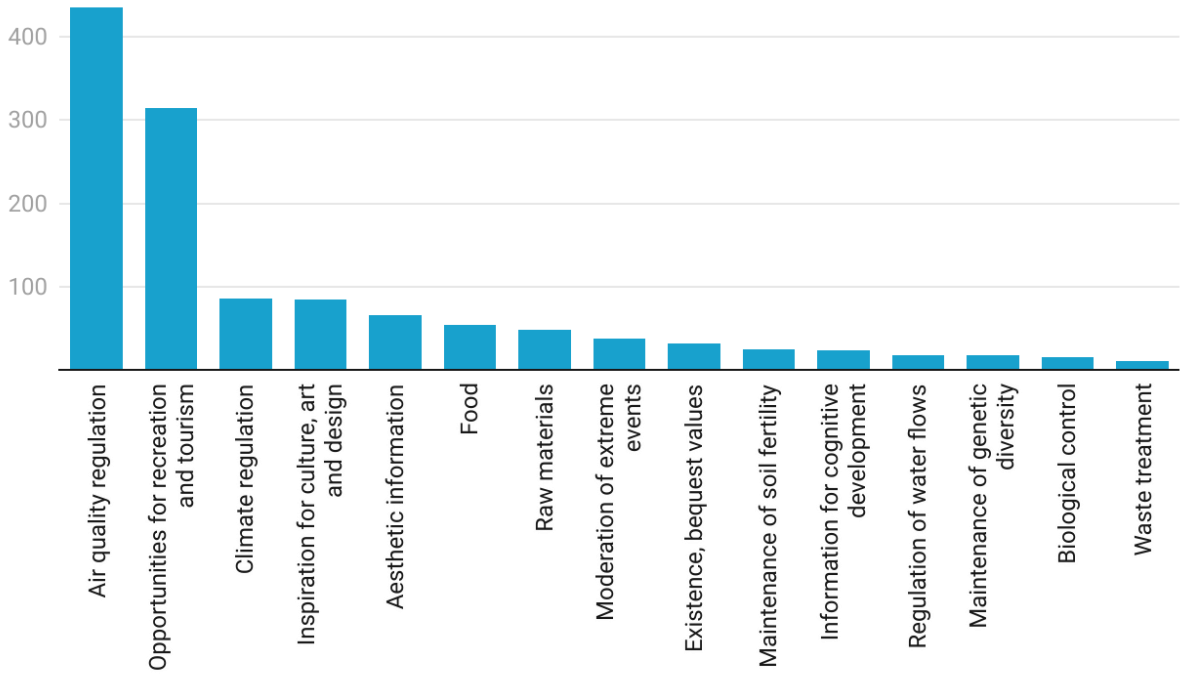


Figure 12: Number of value estimates per Ecosystem Service for UK

As shown in figure 13 below, from a valuation method point of view, damage cost avoided is the most common by a large margin at 34%, followed by choice modelling at 22%. Contingent valuation (15%), travel cost (11%) and market prices (9%) also make up a significant share. The large amount of values relating to damage cost avoided come from the paper investigating pollution removal by vegetation in cities and districts throughout the UK (Eftec and Centre for Ecology and Hydrology 2019). Market price is the most commonly included valuation method in ESVD, but for UK data, it ranks fifth, at 9%.

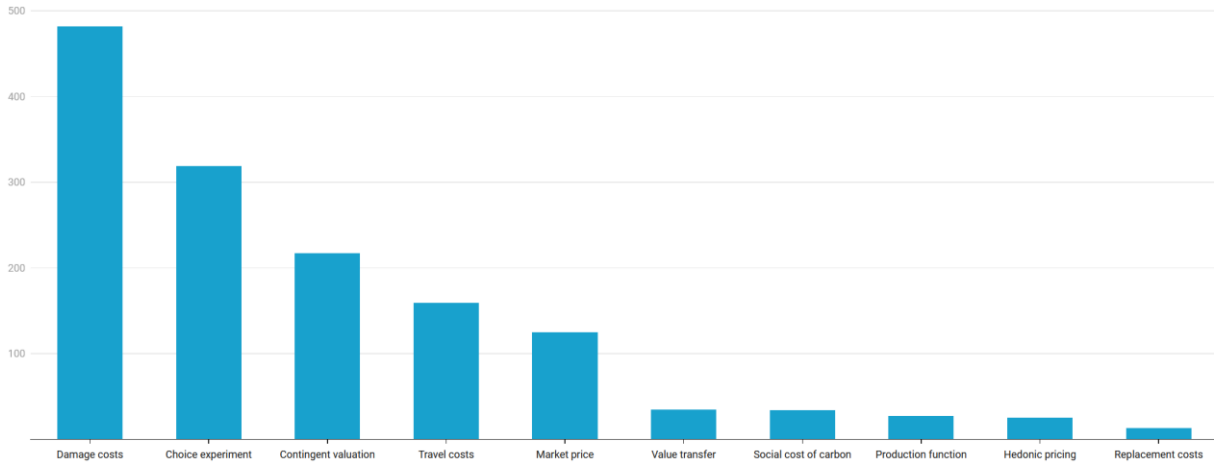


Figure 13: Number of value estimates by valuation method used for UK data

In regard to protected areas, the data are as follows: From the 1443 value estimates, around 30% are from fully protected areas, while roughly 14% are from partially protected areas (see figure 14).

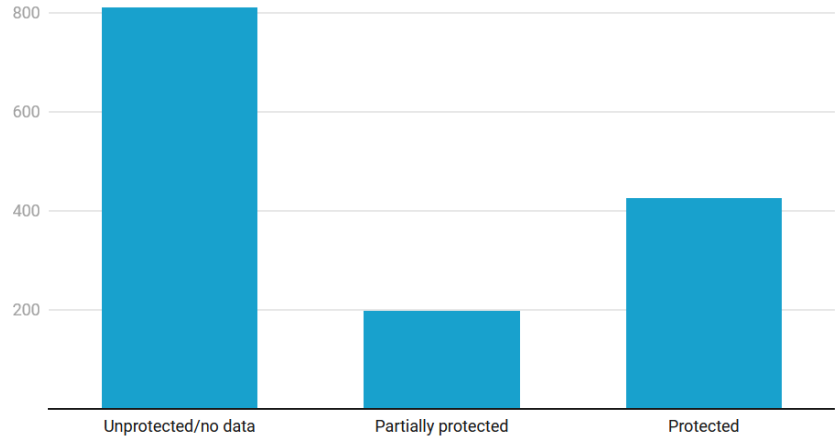
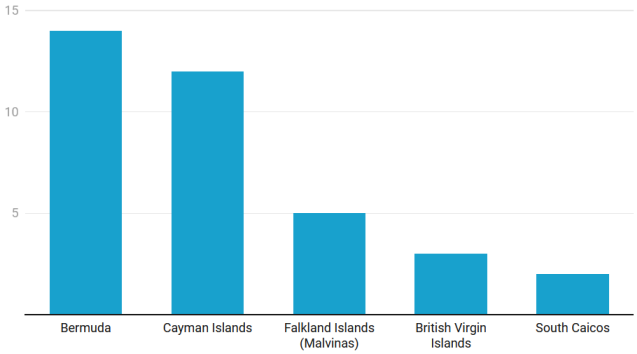


Figure 14: Number of value estimates by protected status in the UK

The British Overseas Territories

There are 36 value estimates from six studies relating to the British Overseas Territories (see table 4). The majority of values estimates from these territories have been inputted as separate territories, i.e. treated as countries external to the UK, even though the territories are officially under UK sovereignty. They are generally geographically distant and very distinct biomes from the UK. Note that 2 (from South Caicos) were marked as data from the UK in the ESVD. The remainder were given a separate country code.

Table 4: Value Estimates for British Overseas Territories



The broad geographical distribution and variety of natural landscapes in the British overseas territories leaves some interesting scope for analysis of their natural capital. Figure 15 below shows the spatial distribution of British Overseas Territories study sites in the ESVD. All the value estimates in the ESVD for British OTs are around Latin America and the Caribbean.

Figure 15: Spatial distribution of British Overseas Territories study sites in ESVD

Figure 16 shows the value estimates per biome for the British OTs. The marine biome represents the majority of value estimates here, at 72%. Coastal systems alone represent 19%, representing 7 of 36 value estimates, with the remaining three value estimates being a combination between marine and coastal biomes.

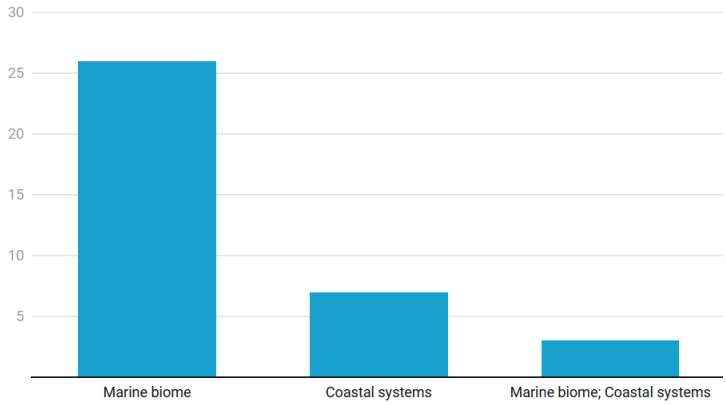


Figure 16: Value Estimates per Biome in British Overseas Territories

In terms of value estimates per ecosystem service, recreation and tourism represents 35%, with climate regulation (24%) and food (12%) representing the second and third highest ecosystem services analysed. Aesthetic information was represented by 2 value estimates, with the remaining categories only having one value estimate each (see figure 17).

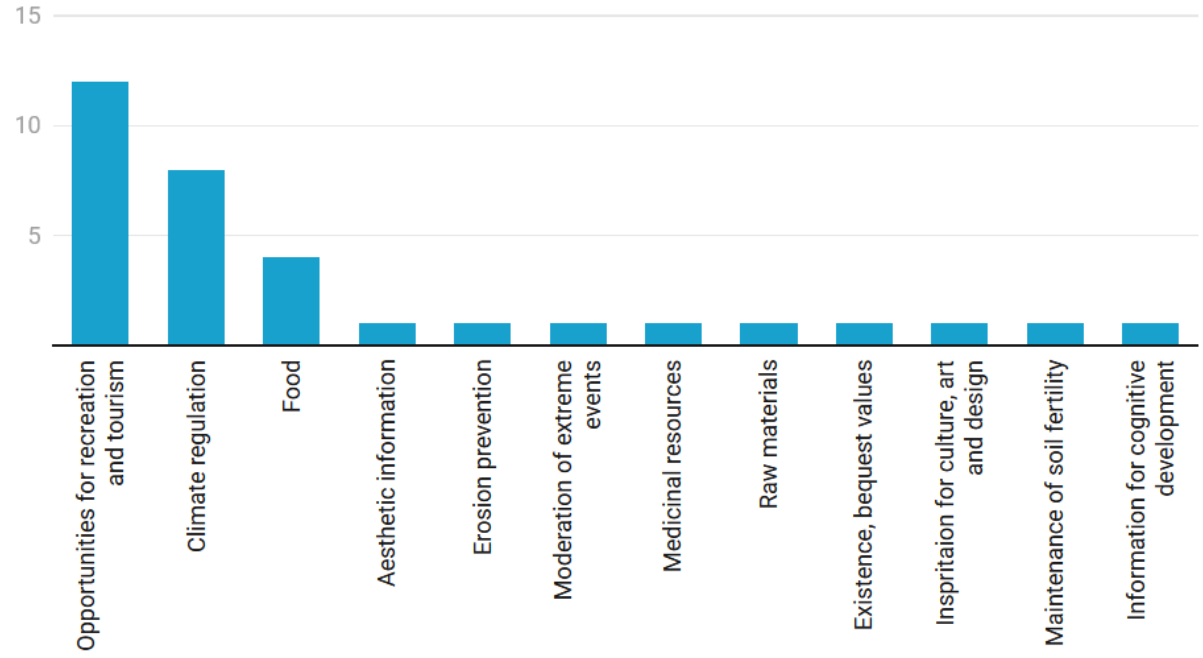


Figure 17: Value Estimates per Ecosystem Service in British Overseas Territories

Ireland

As can be seen from the map (see figure 18), there are very few value estimates for Ireland, with less data points (12) than Northern Ireland alone (14 approx.). Only 6 studies have been analysed so far to produce value estimates for Ireland, leaving significant room for analysis to add to the ESVD.

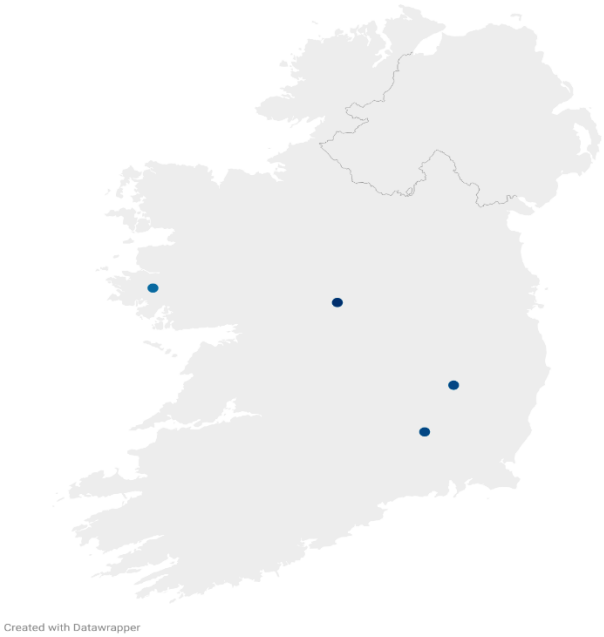


Figure 18: Spatial distribution of Irish study sites in ESVD

Figure 19 shows the biomes represented by the value estimates for Ireland. Two-thirds of value estimates relate to intensive land use, 17% represent the marine biome, and the remaining two value estimates represent the polar alpine biome and a combination of biomes.

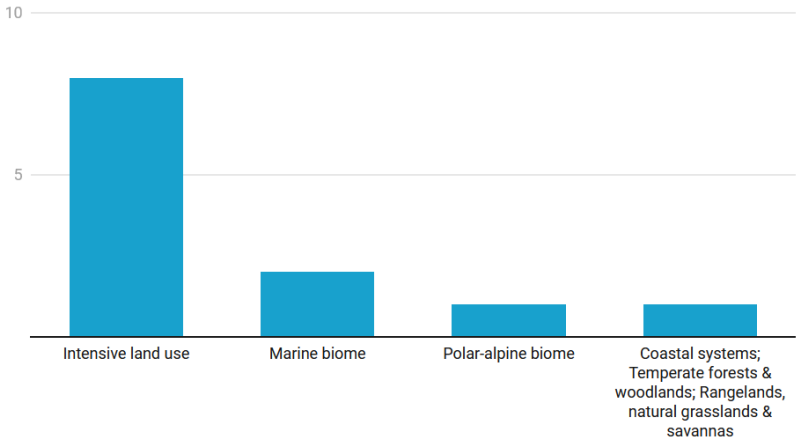


Figure 19: Value Estimates per Biome in Ireland

Figure 20 shows that pollination is the most represented ecosystem service by the Irish value estimates, at 58%. Only two other ecosystem services are represented- recreation and tourism (25%) and Existence/Bequest values (17%).

As for the scale of the studies analysed, three studies were conducted at local level, one at sub-national level and eight at national level. Of the twelve value estimates, only one data point is from a protected area. One is from a partially protected area, and the remainder are from unprotected areas (or no data is provided).

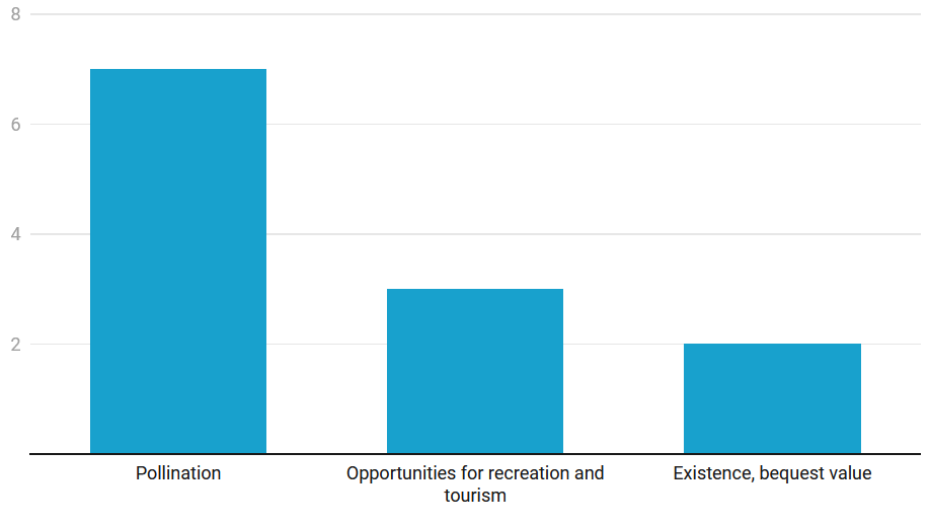


Figure 20: Value Estimates per Ecosystem Service in Ireland

8.3 Summary statistics of monetary value of ES

Table 3 presents the summary statistics for several water- and catchment related biomes. The summary statistics are used for illustrative purposes and provides information on the range of monetary values for the respective countries in the ESVD. It shows the wealth of data already available and to be used by the ENCA, INCASE and NL2120 programmes, but also highlights the gaps, with many ES still excluded due to a lack of data. Some other interesting observations are that most values are present for forest and woodlands, which is also the biome with the smallest total value in the ESVD. This does not indicate the actual lower value, but it is more so described by the availability of data in the ESVD. Most values here relate to ES air quality regulation, with relative scarce data for most other ES. Interestingly, there are large summary values for the provisioning of water for 'Human made structures', specifically for 'constructed reservoirs'. These values refer to the provisioning of drinking water from the Haringvliet. The values in Inland wetlands range from approximately $100 per hectare per year for ES inspiration to over $12,000 per hectare per year for ES recreation. This indicates the wide range of data for different ES and the need to tailor the general data to specific contexts. This range of data is also existing in different ES. For Coastal systems, ES recreation consists of 45 different values, ranging from less than $10 to values in the order of $10,000 dollars per hectare per year. These ranges of values are correct in their respective context but have to be adjusted to the respective policy contexts.

Table 5: Summary values of ecosystem services of various biome types/ecosystems from the ESVD for the UK, Ireland and the Netherlands in $ per hectare per year, including the count (n). Taken from esvd.net.

Biome / Ecosystem service	Marine $^{ha/yr}$ (n)	Coastal systems $^{ha/yr}$ (n)	Inland wetlands $^{ha/yr}$ (n)	Rivers and lakes $^{ha/yr}$ (n)	Temperate forests and woodlands $^{ha/yr}$ (n)	Intensive land use $^{ha/yr}$ (n)	Human made structures $^{ha/yr}$ (n)	Urban and industrial areas $^{ha/yr}$ (n)
1. Food	29 (1)	1,812 (17)	2,000 (4)	252 (1)	5.74 (5)	1,375 (7)		1,192 (1)
2. Water		699 (2)	612 (1)	12,311 (5)			118,027 (2)	
3. Raw materials		488 (11)	1,162 (6)		33 (17)	491 (6)		409 (2)
4. Genetic resources		11 (1)						
7. Air quality regulation		223 (7)	2,762 (8)		1,146 (295)	506 (7)		10,384 (93)
8. Climate regulation		107 (14)	127 (10)	21 (2)	441 (13)	49 (6)		1,529 (14)

Biome / Ecosystem service	Marine $^{ha/yr} (n)	Coastal systems $^{ha/yr} (n)	Inland wetlands $^{ha/yr} (n)	Rivers and lakes $^{ha/yr} (n)	Temperate forests and woodlands $^{ha/yr} (n)	Intensive land use $^{ha/yr} (n)	Human made structures $^{ha/yr} (n)	Urban and industrial areas $^{ha/yr} (n)
9. Moderation of extreme events		7,472 (3)	4,330 (8)		39 (2)	17 (4)		869 (1)
10. Regulation of water flows		82 (1)	195 (3)	44 (1)	121 (1)			620 (4)
11. Waste treatment	218 (1)	2,672 (28)	330 (4)			541 (2)		31 (4)
13. Maintenance of soil fertility		12,359 (1)				480 (8)		
14. Pollination						421 (9)		
15. Biological control						809 (14)		
16. Maintenance of life cycles		192 (10)		77 (1)				
17. Maintenance of genetic diversity		40 (1)	1,425 (2)					
18. Aesthetic information		713 (25)	525 (9)	942 (5)	35 (1)	17 (7)		35,036 (2)
19. Opportunities for recreation and tourism	2,340 (100)	3,470 (45)	12,292 (16)	2,322 (14)	809 (2)	7.05 (1)	1,742 (1)	1,766 (3)
20. Inspiration for culture, art and design		14 (14)	101 (18)	2,672 (5)		16 (16)		
22. Information for cognitive development		1,493 (14)	121 (3)	1,517 (4)	200 (1)		2,977 (2)	2,233 (4)
23. Existence, bequest values	49 (4)				1,882 (8)			
Sum	**2,587 (106)**	**31,847 (194)**	**25,982 (92)**	**20,158 (38)**	**2,830 (345)**	**4,729 (87)**	**122,746 (5)**	**54,069 (128)**

8.4 Overview and analysis ENCA Natural Capital database

ENCA, as a division of the Department of Environment, Food and Rural Affairs (DEFRA), provides extensive detail on natural capital available in the UK from several sources. The ENCA services databook summarises the natural capital data currently available to ENCA . It offers an extensive overview of natural capital from several sources, complete with citations and links to different ecosystem service categories.

The ENCA resources consist of data, guidance, and tools. These offerings provided by the initiative serve as guidance for policy and decision-makers, aiding them in considering the value of a natural capital approach. This is a brief summary of the ENCA resources:

- ENCA guidance is a comprehensive document covering various aspects, including the SEEA natural capital framework, economic valuation of the environment, integrating natural capital into project or policy appraisal, accounting principles, methods, benefits, challenges, and applying natural capital at a local level. The guidance includes an assessment template to consider natural capital effects.
- The ENCA services data book offers guidance and over 200 selected sources of biophysical and valuation studies, covering 25 categories of environmental effects, including ecosystem services and environmental impacts.
- The ENCA assets data book consolidates over 100 UK data sources, tools, and studies for eight natural capital asset categories (urban, freshwaters, marine, enclosed farmland, mountain, moor and heathland, woodland, coastal margins and semi-natural grassland).

- ENCA featured tools provide summaries of tools by Defra and its agencies, offering valuation evidence, biodiversity metrics, valuation of outdoor recreation, and ecosystem services management.
- ENCA case studies are real-world examples illustrating the use of natural capital approaches at various spatial scales, economic valuation informing decision-making, natural capital accounting functioning at different spatial scales, and projects aiming to generate new income streams from investment in ecosystem services.

Natural Capital Database Structure

One of the key take-away points of the Dasgupta review (Dasgupta 2021) is that problems of design and measurement of natural capital remain. In the case of the UK, this becomes clear when we look closer at the ENCA ecosystem services databook and the sources available. For example, a cursory glance at the Office for National Statistics' report on UK natural capital accounts reveals a focus on some ecosystem services over others (Office for National Statistics 2022). The list of categories reveals a focus on agriculture, air pollution, carbon sequestration, fossil fuels, hedonic pricing, minerals, renewables, timber, tourism and recreation, urban cooling and water abstraction. Additionally, there seems to be a lack of primary data in the ENCA accounts, with many values (particularly in larger studies) relating to value transfer methods producing secondary data, which is often unvalidated and based on observation data such as land use percentages (Seppelt, Dormann et al. 2011). This runs the risk of the data being too broad, which can underestimate the real value and full range of ecosystem services provided.

ENCA also places a heavier focus on provisioning and cultural ecosystem services, while ignoring several regulating and maintenance services. While some regulating services are widely included, such as air pollution removal and noise mitigation, other services such as pollination, flood prevention, water filtration are absent. Ecosystem services in the ENCA database which are 'not yet included' are the following: for provisioning services, energy crops, pollination, peat extraction (which refers back to 'soil' category) and supporting navigation. For 'Abiotic flows of natural capital', oil and gas and minerals/fossil fuels are not yet included. For regulating services, water purification and waste remediation are not yet included. If one chooses to look at the ES listed and largely focused on, it becomes clear that the natural capital focus lies largely in the short-term, direct use values, and generally relates to provisioning services. The focus of ENCA is on ES with direct use values, missing indirect use value services, particularly regulating services such as pollination, flood prevention, biodiversity and filtration. This valuation also seems to not focus enough on food provisioning services from both marine and biomes involved in intensive land use.

Overcoming the lack of ES in the ENCA, integrating additional regulating and cultural ES could be beneficial in providing a more accurate and comprehensive overview of all ecosystem services and the total value of these ES in the UK. Relating this specifically to water management, it is important to take a landscape approach. When approaching ES from a catchment management perspective, there is a lack of perceiving all ecosystem services in the catchment, often referring to only one ecosystem service, while a catchment consists of multiple ES. Similarly, the databook covers 8 ecosystems, namely:

- Urban
- enclosed farmland
- mountain, moor and heathland
- freshwaters
- woodland
- coastal margins

- marine
- semi-natural grassland

Because catchment areas usually consist of multiple ecosystems providing multiple ecosystem services, there is currently a lack of integration and connection between different ecosystems and the services they provide. This interaction is key to understand water catchment management. This is an important gap to address, as failure to do so undermines the true value of ecosystem services that are taken for granted, which ENCA acknowledges.

Assessing and including negative environmental effects is also a questionable approach to valuing natural capital available in the UK. Predicting future costs involves a lot of guesswork, estimations and assumptions, and may inaccurately estimate the negative effects of a major climate event, while simultaneously underestimating damage costs avoided. The listed as 'not included' in the ENCA database also fail to include several other ES from frameworks such as TEEB and SEEA-EA.
Value transfer methods also appear to be widespread in the databook. This involves applying the results of a valuation of one site or service and applying it elsewhere. These often lead to inaccurate interpretations of the services being analysed for several reasons. The sweeping, all-encompassing nature of value transfer method does not account for differences in similar biomes e.g. between different rivers, as they are secondary data sources. This is where the ESVD possesses a significant advantage, wherein the data available is sourced from primary data..

ESVD recommendations for the UK and ENCA
In terms of the UK, while there are a significant number of entries in the ESVD, when we account for the type of service, the locations and the ecosystems/biomes being analysed, there is significant room to further increase the number of value estimates for the UK. The lack of regulating ecosystem service data and indirect-use values further emphasises this point. Adding novel primary valuation data to the ESVD will prove beneficial in both strengthening the diversity of the ESVD data, while simultaneously maximising the benefit for ENCA to boost their natural capital data once these values become available.

Figure 21 highlights the level of accuracy of ENCA's data compared to primary data. This is a major benefit of the ESVD, which is composed of primary data that would boost the accuracy and reliability of ENCA's ES data, while also focusing on types of valuation and ecosystem services that are under-represented on ENCA's databook (i.e. non-direct use values, regulating and supporting ecosystem services, biophysical valuations). With additional ESVD data it will become possible to do more elaborate value transfer analyses, leading to better estimates of the value of ecosystem services. Additionally, it will lead to new primary valuation data access in the ENCA database.

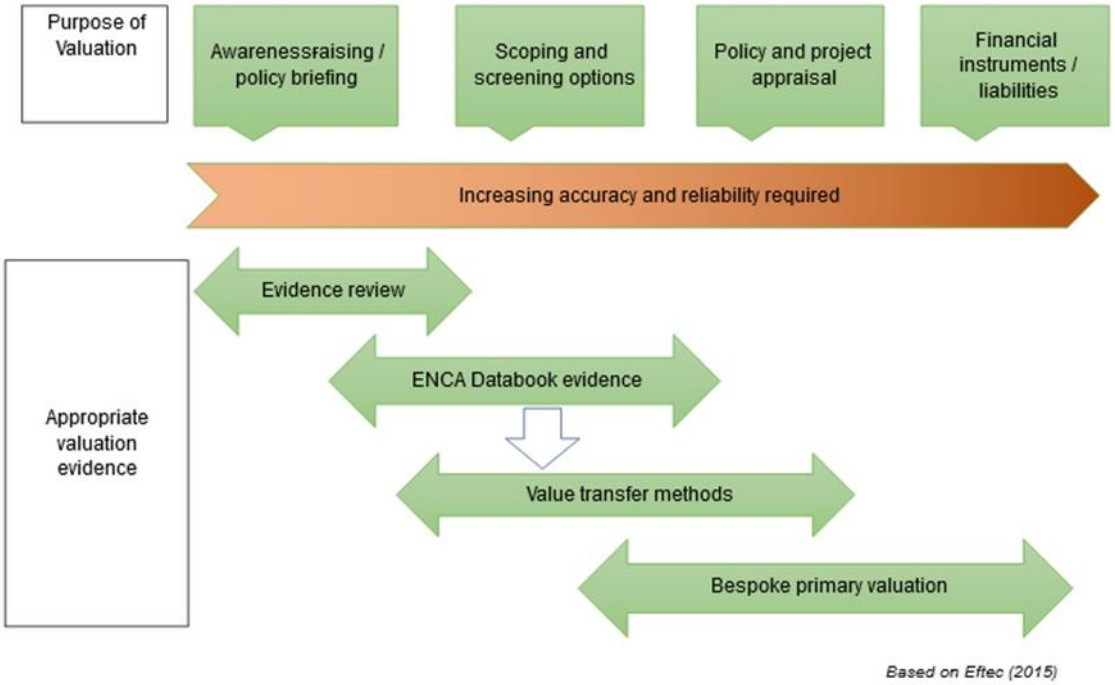


Figure 21: How robust should valuation evidence be? (Source: [UK Government, 2023a](#))

8.5 Overview and analysis INCASE project

The Environmental Protection Agency in Ireland funded the Irish Natural Capital Accounting for Sustainable Environments (INCASE) research project to develop natural capital accounts for different sites in Ireland. Ireland was also the first West-European country to utilize the Biodiversity Finance Initiative (BIOFIN) methodological framework for examining levels of biodiversity finance and how these relate to national biodiversity targets and the international targets of the Convention on Biological Diversity. BIOFIN was initiated at the CBD COP 11, by UNDP and the European Commission, in response to the urgent global need to divert more finance from all possible sources towards global and national biodiversity goals.

INCASE appears to have a different setup to ENCA when it comes to defining and organising natural capital data. INCASE appears to be set up as a specific project by the Environmental Protection Agency (EPA) with more specific goals in mind and appears to be set up as a more temporary project, with a final report that was scheduled for the end of 2023. The program involves collaboration between various actors in natural capital in Ireland, particularly university professors in the field. In any case, the findings of the INCASE Project are set to be used to inform the development of natural capital accounts in Ireland, in particular relating to catchment management. INCASE by itself does not appear to have access to a services databook to the extent of detail that ENCA has but has source materials that can be collated to assess their access to ecosystem service information.

Natural Capital information availability

Integrated Catchment Management (ICM) is a large focus of the INCASE project, which plays a central role in the natural capital accounting (NCA) of Ireland. The INCASE project has progressed in 3 phases. Phase 1 involved a literature review on NCA to decide a methodology, and the selection of catchments for analysis to structure a proposal for nationwide catchment management plans. Phase 2 analysed the selected catchments, namely Bride, Caragh, Dargle and Figile. Phase 3 involves an economic analysis to assess how policy change will impact natural capital stocks. Thus, in all stages of this project, a natural capital account is needed for phase 2 and phase 3 to accurately analyse the economic value of nature in the chosen areas. INCASE settled on the United Nations System of Environmental-Economic Accounting - Experimental Ecosystem Accounting (SEEA-EEA) approach as a measurement framework for tracking ecosystem changes and outputs (INCASE, 2020) to scale up to a national level.
INCASE seems to organise its environmental accounts in a similar vein to ENCA, gathering a significant amount of data from semi-state bodies such as Coillte (forestry management) and Bord na Móna (peatland management) for data. The Central Statistics Office (CSO) also provides a valuable source to INCASE . However, similar to ENCA, these accounts have a problem of excluding regulating ecosystem services such as pollination, water filtration and habitat diversity. The SEEA-EEA accounts only report final services, i.e. services that provide direct benefit to economy and people (e.g. provisioning services such as water supply, timber).
This does not allow a complete assessment of the economic value of the ecosystem services available, and leaves room available for the ESVD to bolster the INCASE portfolio by valuing intermediate and supporting services.
INCASE also acknowledges the need for assessing the natural capital in marine biomes. While projects were conducted by the Socio-Economic Marine Research Unit to assess marine ecosystem services, it was broad, largely based on secondary data, and considering the extent of Ireland's marine area, undervaluing the extent of the ecosystem services provided by Ireland's marine biome.

ESVD-recommendations for Ireland
There is an overall geographical gap for Ireland in the ESVD, with only twelve value estimates for the whole country. This means that any additional data, no matter the biome, ecosystem or ecosystem service analysed, would be beneficial to boost Ireland's representation on the ESVD. Ireland doesn't appear to have its natural capital accounts as centralised and collated as the UK, with ENCA and their services database.

Catchment Management
When considering biomes, marine and coastal biomes should be given high priority in relation to Ireland's ecosystem services. Ireland's marine territory (880,000 km2) is over ten times greater than the Republic's land area at 70,282km . With this fact alone, from an ES perspective, it is likely to be Ireland's greatest asset in terms of natural capital. It provides a wealth of ecosystem services in all of the major categories. While values were provided by EPA , more detailed information and primary data is required for the ESVD.

8.6 Ecosystem and stakeholder list UK and Ireland according to catchment design

Picturing and describing the connection between multiple ecosystems which make up a catchment is particularly important, especially when the focus is on water management. Water by nature

originates from several different ecosystems, which combine to provide ecosystem services from source to sea.

Catchment-related ecosystems
Figure 22 is a simplified version of the main ecosystems related to catchment management. There are several stakeholders involved in all ecosystems related to catchment management, creating a complex net of actors.

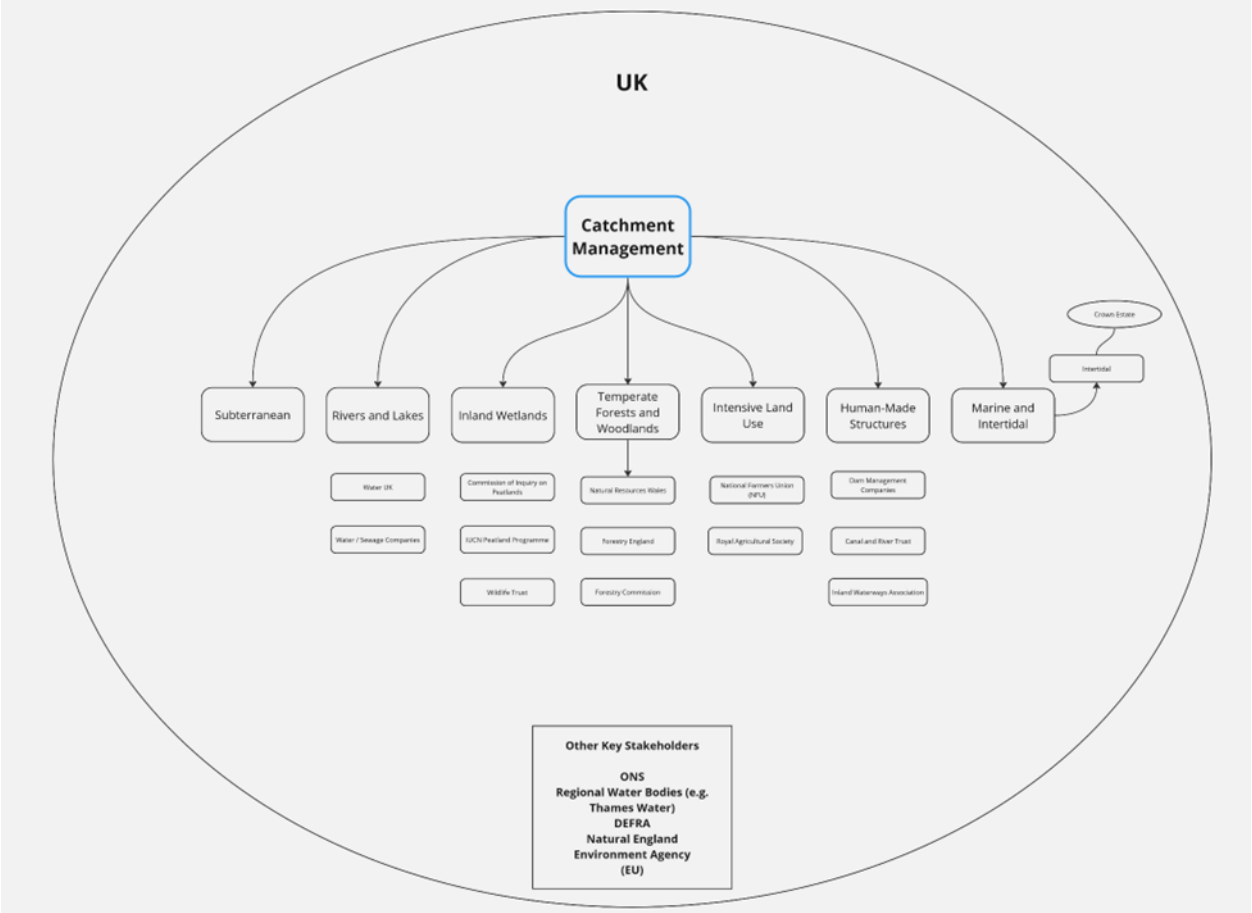


Figure 22: UK Catchment Management Diagram

Ecosystems of interest - Catchment management related ecosystems

Human Made Structures
UK: Sewage and water infrastructure is a complex network of public and private networks in the UK. England and Wales are the only countries in the world where water and sewage are fully privatised. The water and sewage in Scotland and Northern Ireland remain in public ownership. With privatisation comes additional complexity with network management.
In relation to the ESVD, these networks play a central role in ecosystems and catchment management. Ageing infrastructure and excessive demand on water and sewage networks is resulting in releases of excess sewage and water contamination. Evaluating the costs of this to local ecosystems and damage cost avoided would be a significant first step in highlighting the value of this problem to stakeholders and potentially giving the greatest contribution to catchment management.

Ireland: Ireland has significant infrastructure issues with water and sewage management, with some high-profile infrastructure issues highlighting this. This included water shortages, catastrophic network failure and supply contamination. 38% of Ireland's drinking water is estimated to be lost in leaks . With demand increasing rapidly due to industry and population growth, focusing on how this relates to ecosystem services may be useful.
Ireland's significant coastline means there are many human-made structures around the coastline. Aside from provisioning molluscs, shellfish and salmonid farming, they can also serve as filtration for intertidal zones and estuaries. This can be seen, for example, in the filtration capacity of oysters. This also represents a service worth analysing

Sub-terranean
UK: Groundwater from caves and aquifers represents a significant amount of drinking water supply in the UK, particularly in England and Wales. Scotland and Northern Ireland do not have the same extent of groundwater extraction, constituting only 5% of Scotland's drinking water (excluding Northern Ireland). At the same time, due to the extent of its use in England and Wales, it is worth considering in relation to water provision and the ESVD. In terms of catchments, other activities (such as intensive land use) will have impacts on groundwater policy, opening up another area for analysis in this biome. As this is an ecosystem which also has relatively little data in the ESVD and which is generally little researched, it is interesting to compile and analyse all data which is available.

Ireland: Due to the vast expanses of limestone across Ireland, there are significant cave systems and aquifers providing water to local communities, often connected to rivers and lakes. This again highlights the importance of treating a catchment as a whole entity from source to sea over focusing on individual biomes and ecosystems. Due to their underground nature, values relating to water provision will likely be most beneficial.

Inland Wetlands
UK: Peatland covers a significant amount of the land area of the UK, approximately 10% (around 3 million hectares) (IUCN 2024).Peatlands store some of the highest carbon stocks per hectare of terrestrial and coastal ecosystems (Epple, García Rangel et al. 2016). Thus, looking at peatlands from a conservation perspective in regulating services (filtration, flood prevention, carbon storage), shows their large importance. This creates a good incentive to include additional ESVD data on peatlands and inland wetlands in general which could be used by ENCA.

Ireland: Inland wetlands of various types comprise a significant amount of land area in Ireland, with 16% of national territory covered by peat bogs, moors and heathlands as of 2018 .
Peatlands have amongst the highest stocks of carbon per hectare of all natural ecosystems on land and coast (Epple, García Rangel et al. 2016). With the extent of territory that peatlands cover in Ireland, and their role in catchment management, peatlands should be centred in the ESVD analysis. This should be combined with other nature-based solutions, such as grants that encourage preservation of peatlands over harvesting for fuel. With proper valuation of the damage costs avoided from peatland preservation, there is potential to place significantly more value on Ireland's peatlands and highlight to a greater extent the natural capital available. Data for this is largely available from Bord na Móna, who manages the peatlands of Ireland. Other sources include the CSO and literature from local universities.

Rivers and Lakes

UK: Some details on how rivers are part of water management are detailed in the 'inland wetlands' section above, once again highlighting the integrated nature of water catchment.

Temperate Forests and Woodlands

UK: While there is quite a significant number of valuation data on this biome, it mostly relates to one ecosystem service (pollution removal) and one valuation method (damage cost avoided). Therefore, there is still a good opportunity to include additional data in the ESVD and subsequently for the use of natural capital accounting data in the UK. This is especially true when one considers that it represents a significant amount of land use that the UK aims to grow into the future with reforestation schemes, which could be tied to PES schemes.

Ireland: Analysing forest ecosystem services should go hand-in-hand with inland wetlands, which are often in proximity to each other in Ireland. Ireland's National Forestry Inventory estimates Ireland's forestry cover being approximately 12%9. This is low for the EU but growing rapidly. Irish forests have also faced controversy in recent years, with a significant amount of reforestation consisting of Sitka Spruce plantations. These compromise nearly 51% of Irish forests9, resulting in 'ecological deserts' . An interesting approach for the ESVD may be to use biodiversity data to compare Sitka plantations versus native deciduous forests from an ecosystem service perspective. This would also represent an ideal avenue to explore nature-based solutions.
Coillte appears to have significant data on forestry and ecosystem services, particularly the ForES group within the organisation. Along with a source of primary data, this offers a good starting point for collaboration for nature-based solutions in forestry, along with Staatsbosbeheer in the Netherlands, the Forestry Commission in the UK and its related local subsidiaries.

Intensive land use

UK: The data currently available on biomes in the UK in ESVD does not reflect the real-life land use in the UK. Agricultural land covers 71% of the UK's total land area . Thus, when it comes to looking at natural capital, the biomes within and around this agricultural land are of significant importance. Considering how significant the land use for agriculture is, there is a lack of data in the ESVD on provisioning ecosystem services. This again provides a good opportunity for additional data. Also key to understanding the relationship between catchment management and intensive land use is the costs of nutrient pollution and benefits of prevention.

Ireland: Ireland has quite similar gaps to the UK, wherein agricultural land represents the largest percentage of land area, at 66% . With the scale of intensively farmed land in Ireland (59% grassland), intensive land use is worth investigating further in terms of adding future value estimates to the ESVD. While two-thirds of value estimates represent land use, there remains a low quantity (eight). With production function representing seven of eight of these land use valuations, there is room to explore other forms of ecosystem services relating to Irish agricultural land.
On land, Ireland's rural agricultural landscape is highly pastoral, with a cattle population higher than the human population. Rearing cattle takes up a significant amount of land and resources, and nutrient pollution and agricultural emissions represent a threat to ecosystem health through nutrient pollution, agricultural emissions, land use changes and water consumption. Indeed, Irish wetlands are often severely impacted by soil drainage to increase agricultural land for beef and dairy farming. It may be an interesting point for analysis in relation to catchments and nature-based solutions.

Biodiversity is also an interesting point for analysis with agriculture, with land often being reclaimed to increase land available for animal agriculture. The valuation of maintaining biodiversity in intensive land use biomes represents an interesting area for valuation and nature-based solutions.
Agricultural activity represents the greatest threat to water quality and therefore a significant threat to ecosystem health, making it an important target for ecosystem service evaluation relating to catchment management. Provisioning services appear quite well covered compared to others, and focus could be placed on regulating and supporting ecosystem services relating to agriculture should be considered. A subject like damage cost avoided by nutrient pollution reduction may prove a useful focus relating agriculture back to catchment management.

Marine and Intertidal
UK: Similar things as mentioned under Intensive land-use can be said for marine and coastal biomes. The UK's marine area is approximately 867,400 km2, at roughly 3.5 times the size of the UK territorial extent (UK House of Parliament 2011). Mainland Great Britain alone has 11,073 miles / 17,820 km of coastline . When factoring in Northern Ireland and the Overseas Territories, and the UK coastal waters surrounding these islands, there is very likely to be significant data available on marine ecosystem services. While it is the second most represented biome, the amount of coastline and the ecosystem services it provides means that there is still room to provide further data on marine ecosystem services.
Here, there is once again a lack of data on provisioning services, with most value estimates relating to cultural services, particularly tourism. Given the significant known economic value of the UK's marine resources, there is untapped potential for analysing and quantifying the unknown or unquantified value of their marine resources.

8.7 Contacted stakeholder list

DEFRA: We delivered two seminars on Ecosystem Service (ES) valuation with various departments including Skillful Economics, Waterways, Flood Management, and International Marine and Climate Economics.
World Bank: Discussions with the World Bank team on disaster risk management highlighted the pressing need for robust data on the costs and benefits of Nature-Based Solutions (NBS). Emphasizing the importance of comprehensive cost data encompassing CAPEX and OPEX, and benefit data reflecting diverse ecosystem services is crucial for informed decision-making and scaling up investments in NBS.
Cohab Initiative and Health Interlinkage: Conor Kretsch from Cohab Initiative in Ireland shed light on the critical interlinkage between ecosystem services and health. Explorations into transnational working groups involving stakeholders such as the Irish Government, WHO, and FAO exhibit a promising direction towards a collaborative approach to address this interconnected issue.
Business for Biodiversity Ireland: Engagement with Lucy Gafney and the Business for Biodiversity Ireland emphasized the necessity of transnational cooperation and knowledge exchange. This initiative aims to pave the way for sustainable/nature-positive investment and business strategies, indicating a shared commitment to fostering change across domains. Meetings with Lucy and colleagues illuminated the insight that ES Valuations needed to be translated to relatable and practical cases like NbS.
UCL STEaPP: Partnering with Carla Washbourne from UCL's Department of Science, Technology, Engineering, and Public Policy holds immense potential in establishing a British ESP national network. Meetings with her signified opportunities to bring together ESP members, bridging diverse knowledge domains towards a common goal.

Samenwerkingsoverleg Natuurlijk Kapitaal
Community on the topic of Natural Capital in the Netherlands consisting of representatives of CBS, RVM, WEnR, WEcR, WUR, VU, CPB, PBL and FSD. Which served as a community to discuss and validate insights and emphasized the hypothesys that the time is right to integrate non market ES values in statistical accounts, or at least develop research on how to do this.

Collectief Natuurinclusief: From discussions with Jonne Veldhuis, Lead domain Finance, we learned that in order to design innovative PES mechanisms we need to rethink the capital appreciation. “FI’s can either finance or pay”. When we think of PES schemes are we looking at private investors for payment or financing, in the latter someone else pays and the FI arranges the money.

8.8 Overview how ES valuation can support PES schemes

Support in	Benefit	Application
Valuation for payment setting	The ESVD provides standardized monetary values for ecosystem services across various biomes and continents. This information can be instrumental in determining fair and accurate payment rates for different ecosystem services.	Governments and PES program administrators can use the ESVD to establish payment structures that reflect the actual economic value of the services being provided by ecosystems.
Business model transition	ESVD insights into the 'true' value of nature can assist the business community in transitioning to more sustainable models by internalizing externalities.	Businesses can use the ESVD to guide their decisions in incorporating the real costs and benefits of nature into their pricing strategies and business models.
Cost-benefit analyses	ESVD can be used in cost-benefit analyses to demonstrate the economic advantages of investing in conservation and restoration efforts compared to potential losses from ecosystem degradation.	Governments can use these analyses to make informed decisions about allocating resources for conservation and PES programs.
Impact assessments	The ESVD enables monetary impact assessments, allowing stakeholders to understand the economic consequences of land-use changes on ecosystem services.	Governments can use this information to assess the potential economic losses or gains associated with various development projects and make informed decisions to minimize negative impacts.
Risk assessments	The ESVD can estimate the monetary effects of investments on biodiversity and ecosystems, highlighting the dependencies of businesses and financial institutions on nature.	Governments and financial institutions can use this information to assess the sustainability and potential risks associated with investments, guiding policies and regulations to promote environmentally friendly practices.

Support in	Benefit	Application
Natural Capital Accounting	ESVD can contribute to Natural Capital Accounting by quantifying the value of flows from natural capital.	Governments can use NCA to integrate natural capital values into their economic accounts, providing a more comprehensive picture of national wealth and informing sustainable development policies. This is especially true when created spatially and in collaboration with additional data on degradation, biodiversity loss and property rights.

8.9 Regional chapters and national networks of ESP

ESP hosts twelve Regional Chapters and almost 50 National Networks. One of the regional chapters is West & Central Europe incl. Russia. This Region roughly corresponds to part of the IUCN region Europe, including Russia and Turkey but excluding Central Asia and Overseas territories. Regional Chapters and National Networks exchange information, discuss ideas and experience on ecosystem services assessment and implementation at regional and national levels. Regional Chapters aim to connect local information and experiences on the theoretical and practical application of ecosystem services with those of the international ESP community. By enhancing communication, coordination and cooperation and collating information across National Networks, Regional Chapters also support government, non-government, business, industry, researchers and communities by providing a central repository of information, experiences and experts within a region.

The main objectives of Regional Chapters and activities undertaken by their chairs are:

- Provide a focal point for ESP members within a Region and serve as the link with the International ESP community.
- Provide support and advice to National Networks, and coordinate activities across National Networks within regions.
- Organise, together with the National network chairs, a regional ESP conference in their region every two years, in between the years ESP world conferences are organised.
- Actively approach and engage researchers and practitioners in ES approaches.
- Actively promote sharing and communicating knowledge through ESP in the region and engage through ESP membership.
- Source opportunities for jointly designing and conducting research projects or applications of ES in practice.
- Promote educational opportunities to improve understanding of ES.

National Networks

ESP National Networks aim to improve decision making on ecosystem services by providing a platform for researchers, government, non-government, business, industry and communities to exchange information and experiences on the theoretical and practical application of ecosystem services at local to national scales. The main objectives of National Networks and activities undertaken by their chairs are:

- Provide a focal point for ESP members at the national level, in their national language.

- Organise meetings and conferences of interest to the National ESP members.
- Work together with Regional ESP chairs, to organise a regional conference, in between the ESP World conferences.
- Support the implementation of ES science and practice at national and local levels (eg. by contributing to national assessments and policy evaluations.
- Feed bottom-up information into regional and international activities.
- Maintain a database of researcher and practitioner expertise, contacts and projects.
- Actively promote sharing and communicating knowledge through ESP in the region and engage through ESP membership.
- Identify national funding opportunities.
- Gather national Ecosystem Service (Valuation) data.
- Support in national communication on Ecosystem Services.

Thematic, Biome and Sectoral Working Groups

The Ecosystem Services Partnership facilitates the creation of working groups to create a platform for Ecosystem Services science, policy and practical application. Thematic Working Groups enable the creation of a platform for researchers and practitioners to exchange information and ideas on Ecosystem Services Assessment on specific topics, such as indicators, mapping, modelling, valuation etc. Biome Working Groups provide a platform for researchers and practitioners to exchange ideas on Ecosystem Services Assessment in specific biomes (e.g. forests, grasslands, wetlands, etc.) and make the information available to a wider community of users. Sectoral Working Groups focus on the relation between ecosystem services and specific sectors / users (for example tourism, (agro-) forestry, fisheries, and the conservation community).

ESP currently hosts 18 thematic working groups (TWG's): they work on the theme as a whole or are split in subgroups. TWG members exchange information, discuss ideas and experience, and make this information available to a wider community of users.

Activities of Thematic Working Groups

- Collect, synthesize and exchange information on the WG theme to advance the science and application on that topic.
- Stimulate collaboration between the main organizations involved with the WG Theme.
- Organize workshops during regional and global ESP-conferences or other events.
- Publish (joint) papers.
- Develop guidelines for Ecosystem Services Assessment.
- Contribute to international assessments e.g. TEEB National studies, Sub Global Assessment (follow-up MA), IPBES.
- Contribute to international assessments such as TEEB National studies, Sub Global Assessment and IPBES.

The following Thematic Working Groups are currently active:

- TWG 1 – ES Assessment frameworks & Typologies
- TWG 2 – Biodiversity & Ecosystem services
- TWG 3 – ES Indicators
- TWG 4 – Mapping ES
- TWG 5 – Modeling ES
- TWG 6 – Integrated valuation of ES
- TWG 7 – Economic & Monetary valuation

- TWG 8 – Cultural services & Values
- TWG 9 – ES & Public health
- TWG 10 – ES in Trade-off analysis & Project evaluation
- TWG 11 – Global ES Flows
- TWG 12 – ES & Disaster Risk reduction (DRR)
- TWG 13 – Role of ES in Ecosystem restoration
    - TWG 13A – Biomimetic Solutions
- TWG 14 – Application of ES in Planning & Management
- TWG 15 – ES & Poverty alleviation
- TWG 16 – ES Financing mechanisms (incl. PES)
    - TWG 16A – Tree-based PES (PESFOR-W)
- TWG 17 – ES Accounting & Greening the economy
- TWG 18 – Governance & Institutional aspects
- TWG 19 – Big data & Digital communication
- TWG 20 – Equity in Ecosystem Services research

ESP currently hosts 10 biome working groups (BWG's): they work on the entire biome or are split into subgroups that work on specific ecosystems only. BWG members exchange information, discuss ideas and experience, and make this information available to a wider community of users.

Activities of Biome Working Groups:

- Facilitate information exchange on services and values of specific ecosystems/biomes, discuss typology issues and conduct meta-analysis.
- Contribute to the Ecosystem Service Value Database (ESVD).
- Contribute to the development of a Global Network of field sites. These field sites are used to collect data, test hypothesis and guidelines; and communicate results to ES users, providers and policy makers.
- Organize workshops during regional and global ESP-conferences or other events.
- Publish (joint) papers
- Develop guidelines for Ecosystem Services Assessment.
- Serve as a Review Committee for SERVES (Simple and Effective Resource for Valuing Ecosystem Services) (Earth Economics).
- Contribute to international assessments such as TEEB National studies, Sub Global Assessment and IPBES.

ESP biome working groups:

- BWG 1 – Marine systems
    - BWG 1A – Open oceans
    - BWG 1B – Coral reefs
    - BWG 1C – Coastal systems (excl. Wetlands)
    - BWG 1D – Coastal wetlands
- BWG 2 – Freshwater systems
    - BWG 2A – Freshwater wetlands
    - BWG 2B – Rivers & Lakes
- BWG 3 – Forests & Woodlands
    - BWG 3A – Tropical & sub-tropical forests
    - BWG 3B- Temperate & boreal forests
    - BWG 3C – Woodlands
- BWG 4 – Drylands

    - BWG 4A – Shrublands
    - BWG 4B – Grasslands
- BWG 5 – Mediterranean systems
- BWG 6 – Deserts
- BWG 7 – Tundras
- BWG 8 – Polar regions & High mountains
- BWG 9 – Rural landscapes
- BWG 10 – Urban systems

ESP currently hosts 10 sectoral working groups (SWG's). They focus on the relation between ecosystem services and specific sectors / users such as tourism, (agro-)forestry, fisheries, food production, pharmaceutical industry, energy sector, indigenous peoples, local communities and the conservation community. SWG members exchange information, discuss ideas and experience, and make this information available to a wider community of users.

Activities of Sectoral Working Groups:

- Collect, synthesize and exchange information on the WG theme to advance the science and application on that topic.
- Stimulate collaboration between the main organizations involved with the WG Theme.
- Organize workshops during ESP- regional and global conferences or other events.
- Publish (joint) papers
- Develop guidelines for Ecosystem Services Assessment.
- Contribute to international assessments e.g. TEEB National studies, Sub Global Assessment (follow-up MA), IPBES.
- Contribute to international assessments such as TEEB National studies, Sub Global Assessment and IPBES.

The following Sectoral Working Groups are currently active:

- SWG 1 – ES in Agricultural production systems
- SWG 2 – ES in Fishery & Aquaculture
- SWG 3 – ES in Forestry production systems
- SWG 4 – ES in Mining, Energy and Transport systems
- SWG 5 – ES in Water management
- SWG 6 – ES in Business
- SWG 7 – ES in (eco) Tourism
- SWG 8 – ES in Conservation
    - SWG 8A – Task Force on Agrobiodiversity *(Ecosystem Services of Crop Wild Relatives and Landraces)*
- SWG 9 – Indigenous people & Local communities
- SWG 10 – ES in the Circular Bio Economy