LIFE ProForPES

Promoting effective forest PES through the EU financial and state aid programs

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WP2 “Framework for assessment of PES-related mechanisms”

Deliverable 2.2 Analysis of PES and PES-related mechanisms in Europe

Executive summary

The **LIFEProForPES project** aims to systematically evaluate the outcomes of past and ongoing European Union (EU) projects funded by the European Commission. The project seeks to capitalize on the achievements of these initiatives, which involve extensive networks of partners from policy, administration, business, NGOs, and civil society groups at both European and international levels. The overarching objective is to enhance the sustainability of forest ecosystem services (FES) provision in Europe and generate insights into the feasibility and scalability of the most innovative and successful projects.

For the "Analysis of PES and PES-related mechanisms in Europe" (Deliverable 2.2) we based our theoretical framework on the work by Hejnowicz et al. (2014) by evaluating the outcomes of payments for ecosystem services programmes. The approach builds on the work of Wunder et al. (2008), Daniels et al. (2010), and Pattanayak et al. (2010) to systematically appraise PES project management interventions according to a Capital Asset Framework (CAF). This allows to systematically compile, consolidate, and analyze PES literature, describe PES projects and their 'measured outcomes.' It also allows to identify barriers to PES uptake and potential opportunities for enhancing project success.

The theoretical framework consists of three parts:

1. **Part 1** deconstructed PES arrangements, focusing on project operational and implementation arrangements, project design and institutional arrangements, and project financial and funding arrangements.
2. **Part 2** involves a Capital Asset Analysis of PES outcomes, examining Human and Social Capital, Natural Capital, Financial Capital, and Institutional Capital.
3. **Part 3** identifies barriers and opportunities for improving PES projects' design and implementation.

The data collection process comprised three distinct steps:

1. **Data Compilation:** Data from 108 selected case studies of PES and PES-like schemes across Europe were gathered, sourced from databases derived from previous EU

projects. This analysis utilized the framework developed in the Task 2.1 of the LIFEProForPES, extracting information on the operational and implementation arrangements, as secondary data sources, including scholarly databases and findings from projects such as H2020 SINCERE, H2020 InnoForESt, H2020 Nobel, PESFOR-W.

2. **Survey Distribution and interviews:** To increase the quality of information from different PES initiatives a survey was distributed to over 26 experts of selected PES projects. The survey consisted of three sections (Project Financial and Funding Arrangements, Capital Asset Analysis, and Barriers and Opportunities). The final step involved conducting interviews to explore aspects of the PES projects that may not have been fully covered by the information gathered by the survey.

The analysis of the selected Payment for Ecosystem Services (PES) schemes across Europe reveals a diverse and structured approach to ecosystem management, with a strong focus on regulating services, particularly water management. While local fund management is generally seen as effective and straightforward, EU financial frameworks and state aid programs face criticism for their complexity and bureaucratic barriers. PES programs have positively impacted Human, Social, and Natural Capital, enhancing community engagement, job creation, and access to essential services, although their effect on household income and material wealth is limited. The equitable distribution of benefits and adherence to legal frameworks is confirmed, but transparency and community involvement were identified as issues that need improvement. Overall, while PES schemes offer significant opportunities, such as enhancing public-private partnerships and integrating modern technologies, they also face barriers, including financial constraints, complex administrative processes, and limited stakeholder awareness. Addressing these barriers while leveraging opportunities is essential for the long-term success of PES initiatives.

Acknowledgements

We gratefully acknowledge the European Union for co-funding this project. This study benefited from data collected through five major EU projects and their networks, which provided significant insights into forest ecosystem services and innovative Payment for Ecosystem Services (PES) approaches. The contributions from these projects — SINCERE, PESFOR-W COST Action Network, Nobel Project (H2020), and InnoForESt — were essential in advancing our research and understanding of effective PES strategies. We would also like to express our sincere gratitude to all the individuals who participated in the survey and interviews. Their valuable input and perspectives were critical to the success of this study and provided an in-depth insight to the opportunities and barriers of PES in Europe.

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1. Introduction

1.1. Problem statement

Payment for Ecosystem Services (PES) has become a vital strategy for promoting the sustainable management of forest ecosystem services (FES) in Europe. These services, which include a range of tangible and intangible benefits, are essential for societal well-being. However, forest owners often face challenges in managing forest resources sustainably, particularly when it comes to non-marketable services. EU-funded projects such as NOBEL, SINCERE, InnoForESt, and PESFOR-W COST action have been exploring innovative PES mechanisms to address these issues and involved a broader range of stakeholders in the discussion. Despite these efforts, there remains a need for a comprehensive analysis of the effectiveness of PES schemes and the factors influencing their success. Over the years, PES has evolved from a nascent concept to a key mechanism in environmental policy, yet challenges persist in fully realising its potential. By aligning the insights from past experiences of existing projects, assessing their current situations, and evaluating their future potential based on stakeholders' perspectives, there is potential to enhance the sustainability of FES provision and develop robust policy recommendations (Maier et al., 2021; Primmer et al., 2021; Mann et al., 2021; Mann et al., 2022).

Europe's forests, which cover 35% of the continent's land area, are invaluable for the variety of services they provide (Korhonen and Stahl, 2020). The demand for these services has increased, driven by environmental challenges and a growing population. The COVID-19 pandemic has further underscored the importance of FES, highlighting benefits such as cultural enrichment and biodiversity conservation that were previously undervalued (Grima et al., 2020; Ugolini et al., 2020). However, global warming and human pressures are compromising forest resilience and exacerbating degradation, which widens the gap between the growing demand and the limited supply of these crucial services (IPCC, 2021; Roser et al., 2013; Maja and Ayano, 2021; Mina et al., 2017).

To tackle these challenges, the European Green Deal and other policy frameworks have been implemented. These initiatives aim to promote sustainable development, environmental conservation, and equitable FES provision. Key strategies include the EU Biodiversity Strategy, the Water Framework Directive, the EU Climate Law, and the EU Forest Strategy. These

policies advocate for the adoption of PES to provide financial incentives for forest owners and encourage sustainable forest management (EC, 2020a; Gawel, 2014; EC, 2020b; COWI, 2020; EC, 2020c; EC, 2021).

WP1 of the LIFEProForPES project seeks to enhance understanding of existing PES and PES-like schemes within the EU by developing a comprehensive framework for data collection and analysis, identifying over 100 PES cases across 27 countries, and assessing these cases for their strengths, weaknesses, opportunities, and threats. Additionally, the project aims to improve the integration and promotion of PES within EU financial and state aid frameworks by identifying gaps and opportunities (WP3). Finally, it advocates for the adoption of forest PES and best practices within future EU funding cycles, aiming to develop policy and business guidelines, engage stakeholders through multi-criteria assessments, and disseminate the project's findings to the policy and scientific communities (WP4). These integrated efforts aim to support the sustainable management of Europe's forests and ensure a balanced provision of ecosystem services, aligning ecological and societal needs. To achieve its objectives, the project is organised into five work packages (WP). This document (deliverable 2.2) provides an overview of the second task of WP2, titled "Framework for Assessment of PES-Related Mechanisms."

1.2. Overview of task 2.2 - Analysis of selected case studies

WP2 was designed as a crucial component of the project, in line with the initial proposal's objectives. The work package has been dedicated to systematically collecting and analysing data on payment for ecosystem services throughout Europe. This work package has successfully established a comprehensive database of PES and PES-like mechanisms by integrating information from national case studies and prior EU projects. As outlined in the project proposal, Task 2.2 was meticulously planned to involve the in-depth analysis of more than one hundred selected case studies of PES and PES-like schemes across Europe. This task was dependent on the foundational work conducted in Task 2.1, which was specifically designed to establish a robust theoretical framework. This framework was a prerequisite for Task 2.2, as it provided the methodological guidance necessary for data collection, analysis, and interpretation. The framework included components such as the analysis of PES arrangements, detailing program operational and implementation aspects, country-specific contexts, environmental legislation, stakeholder mapping, selection criteria, monitoring

protocols, and contract agreements. By defining these parameters for the analysis, Task 2.1 ensured a standardised and consistent approach to evaluate the diverse case studies, as planned in the proposal.

Task 2.2 adhered to the original plan of the proposal by utilising the established framework to analyse selected case studies from an initial pool of 200 cases. The final selection of 108 case studies was motivated by the findings of prominent EU projects, including SINCERE, PESFOR-W COST Action, H2020 Nobel, and InnoForESt. The selected cases were chosen based on their classification as PES or PES-like schemes, their relevance to the European geographic context, and the availability of reliable data. While the initial target number of cases was ambitious, given the relatively limited presence of fully developed PES schemes across Europe, it became clear that identifying suitable cases within the region posed certain challenges. The scarcity of PES programs in Europe, combined with variations in data accessibility, necessitated a more focused selection to ensure the quality and depth of the analysis. As a result, the final number of cases is lower than initially anticipated, but remains representative of the key insights and trends in European PES initiatives.

The data collection process was conducted in two phases. The first phase involved applying a theoretical framework to systematically extract detailed information on operational arrangements, design features, and institutional setups of the PES projects. This approach ensured consistency in data collection and analysis.

The second phase included an in-depth evaluation through expert surveys and follow-up interviews. The survey, distributed to the key experts, gathered insights on various forms of capital affected by PES projects, financial structures, and project challenges. 9 experts completed the survey, providing comprehensive feedback. Follow-up interviews were conducted to clarify and expand on survey responses, offering additional qualitative insights into the current state and future directions of PES schemes. Overall, this methodology enabled a thorough investigation of PES mechanisms, highlighting their strengths, weaknesses, and opportunities for enhancement.

This document (Deliverable 2.2) constitutes a comprehensive overview of the analysis conducted within Task 2.2. To provide an overview about the context, the procedure and definitions employed throughout this work, the chapter 2, "State of the Art," will explain all

relevant concepts in detail. This chapter will set the stage for a deeper exploration of the methods (chapter 3) used, followed by a thorough description of the results (chapter 4) and a short overview about the limitations (chapter 5), that will address any deviations from the initial plan. This structure provides a clear and cohesive narrative, ensuring a comprehensive understanding of the work conducted and its implications.

2. State of Art

This section goes beyond a mere review of the existing literature. It serves to clearly define the key concepts and terminologies that will be used throughout the analysis and as a glossary for the survey, ensuring a shared understanding of their meanings and implications. By doing so, this section establishes a solid conceptual foundation for the research, reinforcing the relevance and significance of these concepts within the context of the study. This approach allows for a more precise and coherent analysis, aligning the theoretical framework with the research objectives.

2.1. Ecosystem Services

Society benefits from the environment or nature in various ways, both directly and indirectly; this is the most simplified version of an ecosystem service concept which is traced back several millennia. As the contribution of biotic nature to human well-being appears to be unrecognised and undervalued, ecosystems are continuing to be destroyed (Lele et al., 2013). This has been a crucial concern for humans for many years.

In 1981 for the first time, Ehrlich introduced the term “ecosystem services” to the world highlighting the societal value of nature's functions. Since the 1990s, many investigations have been done that refer to ecosystem services. They started with the utilitarian framing of beneficial ecosystem functions as services in order to increase public interest in biodiversity conservation (Wilson and Matthews, 1970; Westman, 1977; Daily, 1997; Perrings et al., 1992; Haberl et al., 2005; Ridder, 2008; National Library of Australia, 2010; Cardinale et al., 2012; Reyers et al., 2012; Balvanera et al., 2017).

In particular, the Millennium Ecosystem Assessment (MEA, 2005) strongly assessed the consequences of ecosystem change for human well-being. Additionally, other global initiatives including the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services – IPBES, the Ecosystem Services Partnership – ESP, The Economics of Ecosystems and Biodiversity – TEEB, Common International Classification of Ecosystem Services – CICES have used considerable efforts to emphasise the importance of environmental services.

According to MEA, (2005) ecosystem services can be categorised into four main types and their specific services (see Figure 1):

- provisioning services – food, materials and energy, which are directly used by people;
- regulating services – cover the way ecosystems regulate other environmental media or processes;
- cultural services – related to the cultural or spiritual needs of people;
- supporting services – ecosystem processes and functions that underpin other three types of services.

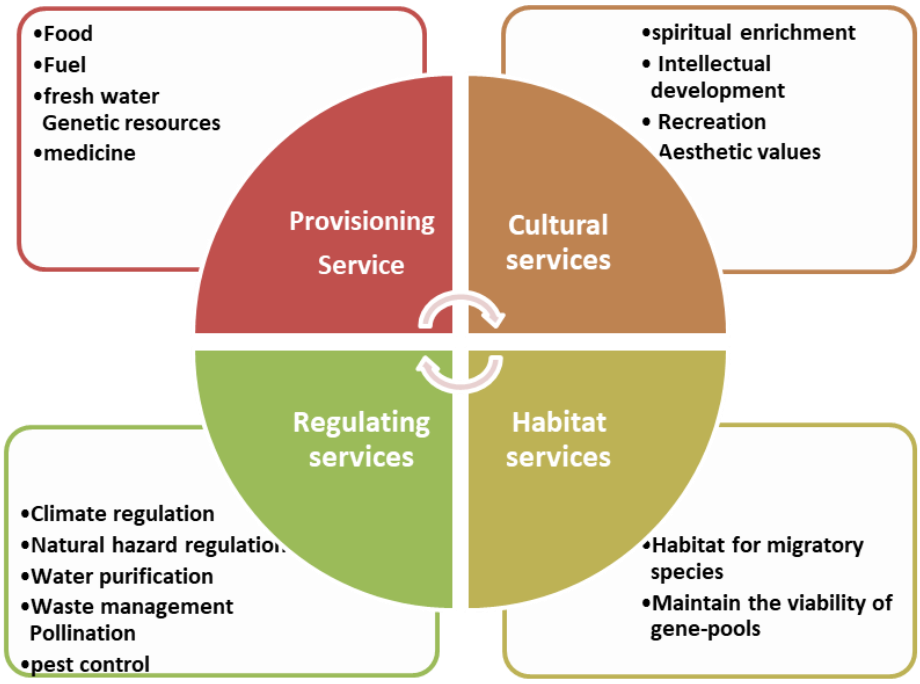


Figure 1 :Type of Ecosystem Services

Source: Millennium Ecosystem Services, 2005, Page 2

2.2. Payments for ecosystem services (PES)

2.2.1. Evolution and definition of PES

PES is a trending topic in environmental resource management and it has been defined as a novel conservation approach and "probably the most promising innovation in conservation since Rio 1992" (Wunder and Wertz-Kanounnikoff, 2009).

Over the past few years, researchers have worked extensively to better define the benefits of ecosystem services and highlight the serious consequences of ecosystem loss. As a result,

there has been an increasing demand for solutions to address these challenges (DEFRA, 2010).

PES is one of the foundations in which a market for ecosystem services can be established. In fact, there are considerable number of researches that provided their own understands about PES (Corbera, Kosoy and Martinez-Tuna, 2007; Wunder and Albàn, 2008; Wunder, Engel and Pagiola, 2008; The Forest Trends, Katoomba Group and the UNEP, 2008; Asquith and Wunder, 2008; Wunder, 2005, 2015; Vatn, 2010; Kinzig et al., 2011; Kemkes et al., 2010). The PES idea is closely connected to the Coase theorem that is referenced to the economist Ronald Coase (Coase, 1937, 1960). The Coase theorem is based on the presumption that says: under certain conditions, a direct negotiation between the affected stakeholders can overcome the issues of external effects such as the initial allocation of property rights (Sattler and Matzdorf, 2013; Engel et al., 2008). The negotiation will then automatically lead to an improved economic efficiency (Pascual et al., 2010; Engel et al., 2008).

However, in practice, high transaction costs, power imbalances, or poorly defined property rights as the difficulties to efficient bargaining can impede a Coasean theory as a purely market-based solution. But the PES concept is not only restricted to Coasean type agreements (Tacconi, 2012).

On the other hand, certain types of government interventions can be counted as PES-like mechanisms which is linked more to another economist, Arthur Pigou (Pigou, 1920) who promoted environmental taxation and subsidisation to correct negative market externalities (Pigou, 1920; Baumol, 1972; Muradian et al, 2010).

In fact, Coasean-type PES are completely voluntary for the stakeholders (specially ES seller and buyer) and the outcome of a private negotiation is needed without government authority, so the payment is fulfilled directly by (private) beneficiaries, for example in order to stop farmers using chemicals in watershed in northeastern France by Nestle (Danièle Perrot-Maître, 2006) or by the City of New York to protect watersheds in the Catskill mountains (NYC DEP, 2002).

However, Pigouvian-type PES can be partly involuntary as the government either makes the payment on behalf of the direct beneficiaries to spur ES provision or intervenes and pays directly by itself (Sattler and Matzdorf, 2013). For example, government disburses the

compensation for conservation in the China's Conversion of Cropland (Gutiérrez Rodríguez et al, 2016) to Forest and Grassland Programme or in the Costa Rica's Environmental Services Payment Programme (Porras, 2018).

In practice, after Coase, the narrow definition by Sven Wunder in 2005 has become generally accepted as the PES definition. This is: "A PES is:

(1.) A voluntary, contingent transaction where

(2.) A well-defined environment service (or a land-use likely to secure that service)

(3.) Is being 'bought' by a (minimum one) ES buyer

(4.) From a (minimum one) ES provider

(5.) If and only if the ES provider secures ES provision (conditionality)" (Feng et al, 2018).

In addition, the conceptualisation of **PES-like schemes** is less linear. Indeed, a clear definition of this concept does not exist. As PES-like schemes are intended those marketable approaches that partially respond to the PES definition by Wunder (2015) not complying with all the 5 criteria.The following 5 criteria can be defined as a **prerequisite for PES project** being classified as PES scheme:

1. Ecosystem services and geographical boundaries need to be identified;

2. The sellers/providers and buyers/beneficiaries need to be identified;

3. The market and of the price need to be defined;

4. The governance, institutional and legal arrangements need to be determined;

5. The biophysical data baseline data for the monitoring system need to be collected (UNDP, 2012);

2.2.2. Stakeholders of PES

Identifying key stakeholders is a crucial step in developing a successful PES scheme. Below is a description of the primary potential stakeholders involved in such initiatives:

a) ***The sellers/providers***

are entities that offer or supply these services in exchange for compensation. They play a crucial role in ecosystem services markets and PES programs by managing or protecting ecosystems to deliver valuable services. Providers can vary widely depending on the context and the type of service offered. They may include:

Individuals: landowners or farmers who implement sustainable practices to enhance soil health, water quality, or biodiversity.

Communities: groups that manage local resources and undertake conservation responsibilities, as seen in cases like the Canopy Walk at Kakum in Ghana, where both communities and the government manage forest resources to reduce degradation (Kalunda, 2016).

Private businesses: companies that engage in activities such as wetland restoration or forest management to offer services like water filtration, carbon sequestration, or habitat restoration.

Non-Profit organisations: conservation groups that manage protected areas or carry out habitat restoration projects, often funded by government agencies or philanthropic contributions.

Government agencies: entities that may oversee or directly engage in ecosystem management and conservation efforts, sometimes in partnership with other providers.

Ecosystem service providers may either negotiate contracts directly with beneficiaries or participate in market-based mechanisms and government programs to receive compensation for their efforts. Their role is essential in incentivizing the conservation and sustainable management of ecosystems, creating economic opportunities, and ensuring the continued delivery of valuable ecosystem services.

b) ***The buyers/users***

are entities that recognize the value of ecosystem services and are willing to pay for their preservation, restoration, or sustainable management. These buyers can be government agencies, businesses, non-profit organisations, or individuals seeking to maintain or enhance specific services for their own benefit or for broader societal gains. For instance, a city

government may invest in watershed protection to secure a clean water supply, while a tourism company might purchase carbon offsets or support reforestation projects to mitigate its carbon footprint. By funding these services, buyers play a pivotal role in incentivizing the conservation and sustainable use of ecosystems (Muñoz Escobar et al, 2013), as shown in Figure 2.

Figure 2: A schematic example of PES scheme

Source: (Raes et al, 2015)

c) ***ES direct beneficiary***

is the entity that benefits from ecosystem services, the ones that directly or indirectly gain from the goods and services ecosystems provide. These entities can include individuals, communities, businesses, and entire societies. For example, farmers rely on fertile soils for agricultural productivity, urban areas benefit from green spaces that mitigate air pollution and reduce the urban heat island effect, and people everywhere enjoy natural landscapes for recreation and relaxation. Recognizing and understanding these beneficiaries is crucial for effective ecosystem management and conservation. This awareness helps policymakers, land managers, and communities make informed decisions to sustainably use and protect ecosystems, ensuring the continued provision of these valuable services.

d) ***Project initiator***

is the entity or individual responsible for conceptualising, designing, and launching a PES scheme. This role often involves identifying the need for ecosystem service protection or enhancement, bringing together key stakeholders, and setting up the framework for the PES initiative. Project initiators can come from various sectors, including:

Government agencies: often, public institutions initiate PES projects to achieve conservation goals, manage natural resources sustainably, or address specific environmental challenges.

Non-profit organisations: conservation NGOs may act as initiators by advocating for PES schemes that align with their mission to protect biodiversity, restore habitats, or support sustainable livelihoods.

Private sector companies: businesses may initiate PES projects to mitigate their environmental impact, fulfil corporate social responsibility (CSR) objectives, or secure the natural resources they depend on.

Local communities: in some cases, community groups or indigenous peoples initiate PES projects to protect their local environment and cultural heritage while gaining economic benefits.

The project initiator plays a critical role in laying the groundwork for a PES scheme, including securing funding, defining the roles of stakeholders, and ensuring that the project aligns with ecological and social objectives.

e) ***The facilitator/intermediary***

Arguably an intermediary is not an essential requirement for a PES scheme. In simple terms PES intermediaries can be defined as those actors performing functions that facilitate transactions between buyers and providers of ecosystem services (Pham et al., 2010; van Noordwijk et al., 2007; Wunder, 2006). PES intermediaries play a crucial role not only in facilitating transactions but also in connecting PES initiatives to broader development agendas. They help exchange information, knowledge, and resources, which are key functions identified by organizations as part of the intermediaries' role in existing PES programs. (Pham et al., 2010, Swallow et al., 2009; Khurana, 2002; Lee & Mahanty, 2007; Leimona and Lee, 2008; Locatelli et al., 2008). Intermediaries have been found to encourage the support and

development of local organisations and their internal structure, which were also administrative functions prevalent across organisations in some studies (Pham et al., 2010; Lee & Mahanty, 2007; Leimona & Lee, 2008; Locatelli et al., 2008; Wunder 2006). There is also capacity in the role of networking, which has been demonstrated to be useful in PES for situations such as bridging relationships between buyers and sellers (Van Noordwijk et al., 2007) and networking to identify program investment and funding prospects (Corbera, Kosoy and Martinez-Tuna, 2007).

Public, private, civil society and research organisations, collaborative groups and individuals can all potentially act as PES intermediaries, however, the non-government actors are more flexible to act as intermediaries, in different scales: from the local to regional, national and even transnational level (Huber-Stearnset al., 2013).

2.3. PES key factors

2.3.1. Types of PES scheme

There are several types of PES based on the nature of the transaction (The Global Environment Facility, 2010):

Voluntary from the buyer side: The buyer freely chooses to pay for an ecosystem service, such as a company voluntarily paying for carbon offsets or a water utility compensating landowner for watershed protection.

Voluntary from the seller side: The seller (often landowners or managers) voluntarily agrees to provide the ecosystem service. For example, a farmer might voluntarily participate in a PES scheme to maintain wetlands in exchange for compensation.

Voluntary from both the buyer and seller sides: In these cases, both parties enter the transaction without obligation. An example is a private company paying a landowner to maintain a forest for carbon storage, with no legal requirements forcing either party to engage.

Non-voluntary transactions: In some cases, payments might be compulsory due to legal or regulatory frameworks, such as taxes or mandatory conservation fees that fund environmental services.

These mechanisms vary depending on the environmental context and goals of the program. Often, they aim to correct market failures and incentivize sustainable management of resources, while also addressing both local and global environmental concerns (Smith et al., 2013; FAO, 2008).

2.3.2. Types of PES Business Model

In terms of the origin of funds involved (or actors involved), three broad types of PES business model can be identified:

a) *Public_Public* payment schemes through which the government pays land or resource managers to enhance ecosystem services on behalf of the wider public (Engel et al 2008). So the stakeholders can be a public body, municipality, national or local government. One prominent example is the Schleswig-Holstein Water Utility, which collaborates with public land managers to reduce agricultural pollution in water catchment areas. The utility, a public entity, pays municipalities to adopt practices like reducing fertilizer use or restoring wetlands to ensure clean drinking water (Engel et al., 2008). .

b) *Private_Private* payment schemes as self-organised private deals in which beneficiaries of ecosystem services contract directly with service providers (The Katoomba Group, UNEP and Forest Trends, 2008). So it is an agreement among social actors, such as companies, farmers, associations or cooperatives and privates, where no governmental authority's intervention is required. Private landowners are compensated by beneficiaries of a defined ecosystem service to maintain it. For example in India irrigation water was sold from one village to another in order to improve sustainable agriculture (i.e., stop grazing) (Singh et al., 2013)

c) *Public-private and vice versa* payment schemes that draw on both government and private funds to pay land or other resource managers for the delivery of ecosystem services (Smith et al, 2013). As an example, in Sub-Saharan Africa, National Forest Authority (the NFA) pays participating community groups for each tonne of carbon dioxide sequestered, on delivery, at a price stipulated in the agreement (Kalunda, 2016).

2.3.3. Spatial scale of PES schemes

PES schemes can be developed at a range of spatial scales, including (Smith et al., 2013):

a) ***International:*** examples include Reducing Emissions from Deforestation and Degradation (REDD+) whereby developing countries that reduce or halt carbon emissions caused by forest degradation and deforestation are rewarded. This scheme allows each country receiving payments to implement REDD+ programs and policies.

b) ***National***: for example, the Environmental Stewardship programme in the UK is a government-financed scheme in which about £400 million a year is paid to farmers and land managers on behalf of the public in return for more environmentally-sensitive farming.

c) ***Regional***: for example, downstream water users paying for appropriate watershed management on upstream land. These schemes tend to be private-financed, for example where a water utility pays for… in a region.

d) ***Local:*** for example, a scheme whereby residents collectively fund the efforts of a warden or environmental organisation to manage local green spaces for their biodiversity, landscape and recreational values.

2.3.4. Time scale of PES

Two categories of time scale must be considered when establishing the business model for PES (Smith et al., 2013):

a) *Short-term:* the project duration is commonly implemented for about 2-5 years (Kinzig et al. 2011; Sattler et al.2013 and Wunder et al, 2020), however one of the major ecological concerns about PES implementation in short term is the potential disparity between the short period and the time actually needed to restore and balance the functionality of ecosystems. According to some research, the needed time scale for the restoration of ecosystem services, ranged from < 5 to 300 years (Rey Benayas et al., 2009).

b) *Long-term:* the project duration is commonly implemented for more than 10 years (Kinzig et al. 2011; Sattler et al.2013 and Wunder et al, 2020, however, the long-term durations of PES programmes are often hampered by the need for a continuous flow of financing resources. The long-term duration of PES programmes is also obstructed by the voluntary nature of the agreement in which both the seller and buyer can withdraw from the programme at any time (FAO, 2011).

2.3.5. Capital asset in PES

To assess the effectiveness of Payment for Ecosystem Services (PES) programs as environmental management tools, it's important to consider their impact on various capital assets, including financial, human, social, institutional and natural capital (Hejnowicz et al, 2014). Evaluating these assets provides insights into how PES programs lead to outcomes, which are defined as the likely or achieved medium-term effects of an intervention's activities and outputs.

a) *Financial capital* in the context of PES programs encompasses several key aspects related to the economic well-being of households and communities. Specifically, it involves assessing the impact of PES projects on household income, material wealth, and the financial benefits provided to poorer landowners. Additionally, it considers the diversification of income streams for participants involved in the PES initiative. The flow of funds available for carrying out activities and the equitable distribution of payments are also critical components of financial capital. This evaluation helps determine whether PES programs contribute positively or negatively to the financial stability and prosperity of the communities and individuals they engage. Successful financial outcomes often result from innovation, which in this context refers to the practical implementation of new ideas, such as improved payment structures or novel ecosystem service offerings, that enhance the benefits to participants.

b) *Human capital* in the context of PES programs refers to the skills, knowledge, experience, and health of individuals within a community. It plays a critical role in determining the overall effectiveness and sustainability of these initiatives. Evaluating the impact of PES projects on human capital involves assessing whether they positively or negatively influence key aspects such as food security, poverty levels, living standards, access to social and ecosystem services, and overall well-being.

   Measuring living standards is particularly important, as it provides insights into the broader quality of life within communities involved in PES projects. Living standards encompass access to essential needs like clean water, food, shelter, education, healthcare, and social services. PES initiatives that improve these aspects directly enhance the well-being and happiness of individuals. Furthermore, innovation in human capital—

such as the introduction of new employment opportunities in sustainable sectors like agriculture, eco-tourism, and natural resource management.

Assessing the impact on health and safety is another crucial dimension of human capital. PES projects that promote ecosystem protection, water quality enhancement, pollution reduction, and sustainable land management contribute to better health outcomes and safer environments for communities.

Finally, the evaluation of living standards in PES projects is vital for ensuring long-term sustainability. It helps assess the resilience and adaptability of communities in the face of environmental and economic changes, ensuring that the benefits of ecosystem services support not just immediate needs but also future development and stability (Rudd, 2004; Brondizo et al., 2009; Behrman, 2011, Winters and Chiodi, 2011, Bennett et al., 2012, Moav and Neeman, 2012).

c) *Social capital* in PES refers to the value of social networks, relationships, and community engagement that underpin the effectiveness of these initiatives. It involves evaluating how PES projects impact and integrate social well-being, including access to essential services such as healthcare, education, and clean water. Social capital also encompasses the support provided to local livelihoods, ensuring that any disruptions to traditional practices are addressed and compensated. Key to this is social equity, where benefits are distributed fairly among all community members, including marginalised groups. Additionally, the development of community capacity through training and education is crucial for effective participation in PES projects. The integration of social safeguards and participatory processes further ensures that the rights and cultural values of communities are respected, and that their input influences project **outcomes**. Overall, strong social capital within PES projects fosters resilience, inclusivity, and enhances the overall quality of life for participating communities. (Bebbington, 1999, Rudd, 2000, Adler and Kwon, 2002; Brondizo et al., 2009).

d) *Institutional capital* encompasses the governance structures and transparency mechanisms that facilitate effective management and implementation of ecosystem services. This includes evaluating the impact of PES initiatives on community control over natural resource use, as well as the accountability and transparency of organisations involved. Key aspects of institutional capital include the strength of legal and regulatory frameworks, the involvement of local institutions, and the effectiveness of decentralised

administration in managing funds and awarding contracts. Additionally, the relationships and cooperation among organisations, as well as the accountability of service providers to beneficiaries, play crucial roles. Assessing these factors helps determine whether PES projects contribute positively to robust and transparent institutional practices, ensuring fair and effective governance of ecosystem services.

e) *Natural capital* encompasses the ecosystem structures, functions, and flows of services provided to humans, as well as the impacts of PES programs on land management practices. This includes evaluating changes in forest area and the extent of protected regions, as well as monitoring deforestation rates and shifts in agricultural intensity. The effectiveness of PES projects is assessed by examining their influence on sustainable agricultural practices, land-use changes, and overall biodiversity. Innovative approaches to ecosystem management can lead to positive impacts on natural capital such as enhanced forest cover, improved management of protected areas, reductions in deforestation, and greater biodiversity. Conversely, negative impacts could be indicated by detrimental changes in land management or decreases in ecosystem healthUnderstanding these effects is crucial for determining how PES initiatives contribute to the conservation and sustainable use of natural resources. (Costanza and Daly, 1992, Daily, 1997, van Noordwijk et al., 2007).

2.3.6. Conditionality and Monitoring

Conditionality in PES projects refers to specific requirements the providers must meet to receive compensation for ecosystem services' provision (Schomers, S., & Matzdorf, B., 2013). These conditions ensure the project's objectives are met, promoting accountability and sustainable practices (Porras, et al, 2003). Providers are often required to implement best management practices, such as sustainable agriculture or forest conservation, and maintain or restore ecosystems like wetlands. They must also commit to these practices over the long term and comply with legal regulations, often going beyond what is required by law to generate additional benefits.

A key element of conditionality is monitoring, which involves systematically collecting, assessing, and tracking data to evaluate project performance and outcomes. Monitoring ensures that providers are adhering to the agreed-upon conditions and measures ecological, social, and economic parameters to determine whether the project meets its goals. This

includes tracking metrics like water quality, biodiversity, community livelihoods, and cost-effectiveness. Methods such as field surveys, remote sensing, and stakeholder interviews are commonly used.

Monitoring serves several crucial functions:

- Performance evaluation: Assessing the effectiveness of the PES project in delivering ecosystem services.
- Compliance assessment: Ensuring that providers meet the conditionality requirements, such as maintaining land use practices.
- Adaptive management: Offering data that allows for strategy adjustments to improve project outcomes.
- Transparency and accountability: Promoting transparency through objective data, enhancing accountability to buyers, funders, and stakeholders.
- Learning and knowledge generation: Contributing to the understanding of PES effectiveness by identifying best practices and lessons learned.

These conditions and monitoring processes are outlined in contractual agreements and enforced through regular assessments, ensuring the integrity and success of PES projects. Monitoring not only tracks progress and compliance but also enables continuous improvement through data-driven decision-making.

2.4. European PES projects and initiatives

The European Union has recently funded an array of projects focused on PES, actively contributing to environmental conservation and sustainable development. These efforts reflect the growing recognition of PES as a powerful tool for managing and enhancing ecosystem services. The following sections provide a short overview of the main projects that have so far focused on PES, their objectives, key activities, and outcomes, and demonstrate their impact on both ecosystems and stakeholders. The data and information collected through these projects form the basis of the database on which the present work in the LIFEProForPES was conducted.

2.4.1 H2020 SINCERE

Spurring Innovations for Forest Ecosystem Services in Europe (SINCERE) was a four-year project funded through the European Commission's Horizon 2020 programme. From 2018 to 2022, SINCERE developed novel policies and new business models by connecting knowledge and expertise from practice, science, and policy, across Europe and beyond.

An international Learning Architecture facilitated continuous collaborative learning from the project's innovation actions, which were located in nine regions in Europe and two international cases in Peru and Russia. Innovations developed through SINCERE were intentionally varied in nature but, as a whole, aimed to explore new means to enhance forest ecosystem services in ways that benefited forest owners as well as serving broad societal needs.

SINCERE's research also contributed to the development of a coordinated European policy framework to maximise the value of forest ecosystem services to society and their sustainable provision.

2.4.2 H2020 InnoForESt

InnoForESt was a European project funded by the Horizon 2020-Innovation Action to further explore the delivery of forest ecosystem services and foster the development of innovative policy, management, and business solutions. Starting on November 1st, 2017, and ending on November 30th, 2020, the project brought together a consortium of five European universities, seven environmental and forestry agencies, seven NGOs, and a variety of SMEs, forest owners, and networks.

InnoForESt supported the governance of viable innovations and a multi-actor network by building on pioneer policy tools and business models, establishing new alliances, and involving key stakeholders from forest and forest-related policy, administration, and business.

The project was based on six representative case studies. Focusing on successful policy and business initiatives as pioneer innovations, the project represented a range of biogeographical regions of European forests. These cases were used to stir a discussion, foster and develop similar or upscaled innovations, while building on experiences made and lessons learned from existing innovations. This project contributed to more coordinated, efficient, and sustainable governance and financing of forest ecosystem services in Europe.

2.4.3 H2020 Nobel

Novel business models to sustainably supply forest ecosystem services (NOBEL) was a European project aimed at developing business models and mechanisms to internalise the socio-economic value of forest ecosystems. Running from December 1st, 2018, to July 30th, 2024, the project combined public policy tools with business models to implement payments for forest ecosystem services (FES) at multiple management levels and demonstrated alternative payment approaches in six European pilot sites.

NOBEL explored three business models: 1) Direct payments from private households or businesses to FES providers.2) Payments from businesses to FES providers, with costs passed to clients. 3) Government payments to FES providers, with costs passed to consumers via taxes or fees.

The project also developed a web-based auctioning platform and a spatial information platform to support these models. By discussing management practices, stakeholder attitudes, and consumer behavior with policymakers, providers, and beneficiaries, NOBEL identified policy-driven demands for FES and analysed the governance of successful business models.

Supported under ERA-NET Cofund ForestValue by several European agencies, NOBEL received funding from the European Union's Horizon 2020 research.

2.4.4 PESFOR-W COST Action

Improving the design and environmental effectiveness of woodlands for water Payments for Ecosystem Services" (PESFOR-W) was a European project with the vision to consolidate learning from existing woodlands-for-water PES schemes in Europe and standardise approaches for evaluating the environmental and cost-effectiveness of woodland measures. Running from October 18th, 2016, to April 17th, 2021, the project aimed to improve Europe's capacity to use Payments for Ecosystem Services (PES) to achieve Water Framework Directive (WFD) targets and other policy objectives by incentivizing woodland planting to reduce agricultural diffuse pollution in watercourses.

PESFOR-W had several key objectives: 1) Characterise and evaluate governance models. 2) Assess the environmental effectiveness of targeted woodland planting. 3) Explore the cost-effectiveness of woodland planting for reducing diffuse pollution. 4) Create a European PES

repository of case studies. 5) Develop user guidance on the suitability of models to quantify the effectiveness of tree planting for pollution reduction.

Additionally, PESFOR-W aimed to create a European network to facilitate, extend, and improve PES schemes, exploring the potential for a Woodland Water Code and linking these efforts with broader forest-carbon policy goals. Funded by the Horizon 2020 Framework Programme of the European Union, the project contributed to the advancement of sustainable environmental practices across Europe.

2.4.5 LIFE GoProFOR

LIFE GoProFOR was a European project aimed at identifying and disseminating forest management tools to enhance conservation-compatible uses within the Natura 2000 network. Running from March 2018 to May 2022, the project drew on good practices from the 25-year experience of the LIFE Program and the forestry-related projects it co-financed.

LIFE GoProFOR aimed to encourage the exchange of experiences and best practices for managing biodiversity in forest habitats within the Natura 2000 network. The project sought to increase awareness among institutional managers and operators whose activities impact habitat and species conservation.

The specific objectives of LIFE GoProFOR were: 1) Facilitate active forest management to improve the conservation status of species and habitats. 2) Increase awareness and knowledge of good forest management practices through information and training initiatives targeting the Italian forest sector, including those operating within the Natura 2000 network. 3) Encourage the use of Good Forest Management Practices in the future planning of Rural Development (2021-2027). 4) Promote the adoption of Good Practices in forest planning tools. 4) Raise citizens' awareness of the importance of proper forest management and the value of the Natura 2000 network. 5) Create a national network of good forest practices to be widely disseminated both inside and outside the Natura 2000 network.

Funded by the LIFE Program, the project played a crucial role in promoting sustainable forest management and conservation practices across Italy.

2.4.6 LIFE Carbo Mark

The CarboMark project- development of policies for the creation of local voluntary carbon markets for mitigating climate change, was a pilot financed under the LIFE+ Environment and Governance Programme from 2009 to 2011. The project was created in order to demonstrate the possibility of establishing a voluntary carbon market characterised by the "local" dimension, i.e. the geographical proximity between those who buy and those who sell carbon credits. It is believed, in fact, that the physical proximity of market players contributes significantly to increase visibility and credibility of the trading mechanism, facilitating its appreciation by operators and citizens.

The objectives of the Carbomark project were: 1) to encourage carbon fixation and mitigate the effect of greenhouse gases; 2) to generate income for disadvantaged areas by attributing a value to the carbon fixation service provided by the forest ecosystem; 3) to raise the awareness of local administrations towards the adoption of offsetting strategies; 4) to stimulate emitters to adopt measures to reduce and mitigate their environmental impact.

The project is the result of the collaboration between several entities located in Italy: the Veneto Region, the Autonomous Region of Friuli Venezia Giulia, the University of Padua and the University of Udine.

2.4.7 LIFE Brenta 2030

The LIFE Brenta 2030 project is designed to enhance biodiversity and improve water-related ecosystem services in river habitats, wetlands, and agricultural areas within the Natura 2000 site "Grave e Zone Umide del Brenta." The project primarily focuses on the drinking water sector, which is the most economically significant ecosystem service and a priority for all participating institutions.

The project seeks to promote good governance by creating synergies between drinking water management and biodiversity conservation. It aims to mitigate threats and transform them into funding opportunities for conserving the Natura 2000 site. This aligns with the Gruppo Operativo Brenta 2030, which addresses agricultural challenges in connection with Natura 2000 objectives.

Key Project Objectives: 1) Green and Blue Infrastructure: Implementing infrastructure and restoring wet habitats to support biodiversity conservation and groundwater recharge. 2)

Pilot Mechanism Lending: Developing and implementing a pilot funding mechanism for water resource and biodiversity conservation. 3) Innovative Governance System: Establishing a governance system to ensure the sustainability and replicability of conservation actions.

The project is supported by the LIFE Financial Instrument of the European Union (LIFE18-NAT_IT_000756) and runs from 2019 to 2024.

2.4.8 LIFE IP Gestire 2020

LIFE GESTIRE2020 is an innovative and experimental project focused on biodiversity conservation in Lombardy, co-financed by the European Commission under the LIFE+ Program. The project aims to implement an integrated strategy for managing the Natura 2000 network in Lombardy, with six key action areas: 1) Governance and Management Improvement: Enhancing governance and management models for the Natura 2000 regional network through increased capacity-building activities for stakeholders. 2) Conservation of Habitats and Flora: Implementing concrete actions to conserve habitats and plant species. 3) Conservation of Animal Species: Carrying out targeted actions to preserve animal species. 4) Invasive Species Control: Preventing and combating the spread of invasive alien species. 5) Monitoring Conservation Status: Regularly monitoring the conservation status of protected habitats and species. 6) Strengthening Ecological Networks: Building and reinforcing ecological networks to better connect protected areas.

LIFE GESTIRE 2020 is at the forefront of integrating EU funds to achieve multiple territorial development objectives, setting a precedent for the future of biodiversity conservation projects in Europe.

2.4.9 Interreg ECO-SMART

The ECO-SMART project, funded by the European Union under the LIFE program, ran from April 1st, 2020, to June 30th, 2022. Its goal was to enhance biodiversity conservation in Natura 2000 sites in Italy and Slovenia by developing and piloting Ecosystem Services (ESS) and Payment for Ecosystem Services (PES) methods. The project aimed to create a common, scalable ESS/PES system to plan and implement climate adaptation measures, addressing the strategic role of ecosystem protection in mitigating climate change effects and boosting territorial resilience.

The project focused on assessing the vulnerability of Natura 2000 areas to climate change, testing PES models at three pilot sites, and disseminating harmonised ESS and PES procedures. Key achievements included the development of a detailed database, analysis of effective PES models, creation of adaptation plans, and establishment of agreements with stakeholders. The project also produced a training curriculum and explored innovative solutions to challenges in PES implementation.

Overall, ECO-SMART successfully developed a methodology for biodiversity conservation and climate adaptation in coastal Natura 2000 sites and aims to extend its approach to other sites through further projects and funding opportunities.

2.4.10 Erasmus+ Ecostar

The ECOSTAR initiative, co-funded by the Erasmus+ Programme of the European Union, aims to enhance entrepreneurship and innovation in the forestry sector, particularly in Markets and Economics of Ecosystems and Biodiversity (MEEB). It seeks to foster connections between universities, research institutes, and businesses across Europe.

With the global “nature-based business” sector expanding, encompassing areas like agrotech, ecotourism, and sustainable materials, there is a growing need for specialised support. Despite a €2 trillion turnover and twenty million jobs in Europe’s bioeconomy, opportunities for nature-based businesses are limited compared to tech startups. To address this, the ECOSTAR initiative, in collaboration with Fledge and various partners, has launched the first Nature-Accelerator.

This accelerator provides startups with comprehensive mentorship in entrepreneurship, technology, and science, focusing on financial sustainability and business growth. Additionally, ECOSTAR offers training for young professionals and students to develop high-level entrepreneurial skills in MEEB, helping them turn innovative ideas into successful business ventures.

2.5 PES funding sources in Europe

Funding for European Payment for Ecosystem Services (PES) related projects and initiatives is diverse and can be sourced from multiple avenues, reflecting the multifaceted nature of PES schemes themselves. These funding mechanisms aim to support the conservation of ecosystems, promote sustainable land use, and ensure that those providing ecosystem services are adequately compensated. Here's an overview of the key funding sources and possibilities for PES-related projects in Europe:

2.5.1 European Union Funding Programs

a) *LIFE Programme:* the LIFE Programme, managed by the European Commission, is a key funding source for environmental and climate action projects. It specifically supports initiatives that contribute to the implementation, updating, and development of EU environmental and climate policy and legislation, including PES projects.

b) *Horizon Europe:* as the EU's flagship research and innovation program, Horizon Europe provides significant funding for projects aimed at tackling climate change and protecting biodiversity, which are critical aspects of PES initiatives (European Commission, 2021).

c) *European Agricultural Fund for Rural Development (EAFRD):* EAFRD supports rural development and promotes sustainable land management practices, making it a vital funding stream for PES projects that aim to enhance ecosystem services in rural areas (European Commission, 2019).

d) *European Regional Development Fund (ERDF) and Cohesion Fund:* these funds focus on strengthening economic and social cohesion by correcting imbalances between regions, including through environmental sustainability projects, which often encompass PES schemes (European Commission, 2021).

e) *European Maritime and Fisheries Fund (EMFF)*: EMFF supports sustainable fisheries and the conservation of marine ecosystems, providing financial support to PES projects related to coastal and marine environments (European Commission, 2019).

2.5.2 State Aid Framework

a) *State Aid Exemptions:* Under the General Block Exemption Regulation (GBER), EU member states can provide state aid for environmental protection, including PES

projects, without needing prior approval from the European Commission (European Commission, 2014).

b) *Environmental Protection and Energy Aid Guidelines (EEAG):* These guidelines allow for state aid to be granted for activities that support environmental protection and energy efficiency, which can include PES schemes aimed at preserving biodiversity and ecosystem services (European Commission, 2014).

2.6 PES potential barriers and opportunities

To enhance the design and implementation of Payment for Ecosystem Services (PES) projects, it's crucial to identify both barriers and opportunities through stakeholder's feedback. The table below outlines the categories of barriers and opportunities based on the analysis by Hejnowicz et al. (2014), which identifies key barriers and constraints in the design and implementation of PES projects. This analysis provides a valuable framework for understanding the critical issues that must be addressed to ensure the success of PES initiatives. By recognizing these barriers and leveraging the opportunities, stakeholders can improve project outcomes and enhance the overall effectiveness of PES schemes (Table 1).

Table 1: key barriers and opportunities

Category	Barrier	Opportunity
Transaction costs	High transaction costs hindering effective implementation	Improve organisational coordination and reduce transaction costs through better facilitation
Payment amounts	Payments too low to encourage uptake and renewal	Increase payment amounts to provide realistic alternative income streams
Information access	Inaccessible information for non-participants	Ensure PES participants are fully informed about the scheme's processes, practicalities, and legalities
Land-use restrictions	Restrictive land-use or management practices	Ensure more flexibility in property management and land-use changes

Participation issues	Poorer households struggle with participation	Enhance support for poorer households to increase PES scheme uptake
Property rights	Property rights issues	Improve legislative frameworks regarding property rights and PES contracts
Legal framework	Lack of legal framework	Develop and approve a unified legal framework for PES projects
Communication barriers	Communication gaps between government and local communities	Build trust and improve communication between all stakeholders
Cultural issues	Cultural and traditional issues	Incorporate cultural considerations and respect traditional practices
Implementation constraints	Remote locations, limited financial resources, short project duration, dependency on political will, internal conflicts, lack of real participation, rivalries, certification confusion, landowner conflicts	Increase project permanency, enhance funding arrangements, address internal conflicts, manage competition, and clarify certification advantages
Monitoring delays	Delays in implementing benefits	Improve monitoring of ecosystem services and their outcomes
Consultation processes	Poor consultation processes	Improve consultation and participatory processes to include all stakeholders
Financial guarantees	Lack of financial guarantees	Offer financial guarantees to provide security for participants and stakeholders

This table summarises the key barriers and opportunities for enhancing PES projects, providing an overview of the specific issues and potential improvements associated with each one. As part of the theoretical framework provided in T2.1, the concepts outlined here were used to develop our qualitative analysis, including the survey and interview questions, to gain a deeper understanding of the current status and dynamics of the specific PES case study.

3. Methods

3.1. Data collection process

In this section, we outline the data collection process, which is fundamental to ensuring the rigor and comprehensiveness of our research. The process is divided into two main components: the creation of a comprehensive database and the subsequent in-depth analysis.

3.1.1 Database of selected case studies

Data was collected from five prominent European Union (EU) projects and their networks, which provided extensive insights into forest ecosystem services and innovative PES approaches. Since the data came from various databases, inconsistencies in definitions and reported dates were anticipated. To address this issue, we carefully harmonized the data by cross-referencing definitions and aligning the reporting periods where possible. This process ensured consistency across datasets, allowing for more accurate comparisons and reliable conclusions. Additionally, some cases were repeated or analyzed in more than one project, so we took special care to avoid any duplication in the final analysis. Any remaining discrepancies were clearly documented, and adjustments were made to maintain the integrity of the analysis. The projects included: **SINCERE**: [50 case studies], **PESFOR-W COST Action Network**: [40 case studies], **Nobel Project (H2020)**: [7 case studies], **InnoForESt**: [6 case studies], **Other initiatives:** [5 case studies] (Table 2). The complete dataset is attached to the deliverable in the accompanying Excel file.

Table 2: Selected Case studies

n.	Case study (ENG)	Country(ies)
1	Modular furniture from National park regions	Austria
2	Drinking water protection zone Waidhofen/Ybbs	Austria
3	Funeral forest Lenzburg	Austria
4	Forest groupings	Belgium
5	First Flemish Timber Park	Belgium
6	Integrated Forest and Nature Management	Belgium
7	Rusenski Lom pilot PES scheme	Bulgaria

8	Rusenski Lom Nature Park	Bulgaria
9	PES Case study presented on the Mirna River Basin	Croatia
10	Forest bioenergy in the Protected Mediterranean areas	Croatia
11	ENJOYHERITAGE project	Croatia-Slovenia
12	Long Lasting Institution to promote hybrid ecosystem governance regime	Czech Republic
13	New "Virgin Forest"	Czech Republic
14	Til-Tops outdoor activity parks	Denmark
15	MTB track Hammel	Denmark
16	Copenhagen Energy Scheme	Denmark
17	Water Supply Act Reforestation Levy	Denmark
18	Aalborg case	Denmark
19	Brylle forest for water	Denmark
20	Elmelund Forest	Denmark
21	Drastrup Pilot Project	Denmark
22	Habitat Bank	Finland
23	WildOulanka	Finland
24	Uuhikonoja	Finland
25	METSO – Forest Biodiversity Programme for Southern Finland	Finland
26	Finnish Nature Heritage Foundation	Finland
27	Golfe de Saint Tropez fire protection scheme	France
28	Volvic Catchment Protection Partnership	France
29	Vittel (Nestlé Waters)	France
30	Planting protection forests in Rennes	France
31	The Moises Water Board	France
32	The Vittel Payment Scheme for improved watershed management practices	France
33	Waldaktie (“Forest shares”), Mecklenburg- Vorpommern	Germany
34	The Mangfalltal catchment area/Munich	Germany

35	Lower Saxony, Groundwater Protection	Germany
36	water extraction money / "water penny"	Germany
37	Bionade-Trinkwasserwald	Germany
38	Kaufering scheme	Germany
39	Forest Cemetery	Germany
40	Woodland Burial site	Germany
41	Northeim-Mode	Germany
42	PWS en Munich	Germany
43	Forests for Drinking Water	Germany
44	Lower Saxony cooperation model	Germany
45	Steinbachtal Dam	Germany
46	Big Dhünn Dam	Germany
47	Greening: Implementation of the EU agricultural reform	Germany
48	wild beech	Germany
49	Ecosia	Germany
50	Conservation of alluvial habitats of community interest on the Szabadság (Liberty) Island and side channel in Béda-Karapancsa pSCI (DANUBEISLANDFORESTS)	Hungary
51	Native Woodland Scheme (NWS)	Ireland
52	KerryLife Project	Ireland
53	Provincia Autonoma di Trento (Autonomous Province of Trento) -Primiero	Italy
54	Life+ Making Good Natura (MGN)	Italy
55	Bosco Limite woodland	Italy
56	Land Art in Sella Valley	Italy
57	Living Woodlands	Italy
58	Forest Kindergarten of Ostia	Italy
59	The woodland of happiness	Italy
60	Becoming Trees	Italy

61	Water tariff fee for maintanance of mountainous watersheds	Italy
62	Water-Environmental fees of Trento Province	Italy
63	Ridracoli Dam (Romagna Water fund)	Italy
64	Monte Carpegna Drinking Water	Italy
65	Land stewardship	Italy
66	Bosco Limite Infiltration Area	Italy
67	Ecopay Connect Oglio Sud	Italy
68	Mushrooms of Borgotaro	Italy
69	Mushrooms of Fiemme Forest Common	Italy
70	Trentinerbe standard	Italy
71	Cavalieri Valley Cooperative	Italy
72	The places of the heart	Italy
73	Bosco ethical purchasing group	Italy
74	Lombardy Register of land compensation opportunities	Italy
75	Lombardy funds of sanctions for forest damages	Italy
76	Lombardy Green Fund	Italy
77	Private management of the regional government-owned forests	Italy
78	Green Mosaic	Italy
79	Ecosystem Services supplied by Lombard Forestry Consortium	Italy
80	BioClima initiative	Italy
81	Green Heart of Cork	Portugal
82	The Green Heart of Cork project	Portugal
83	Maramures heritage trail	Romania
84	Adventure Park Brasov	Romania
85	Payment for surface water	Slovakia
86	Long Lasting Institution	Slovakia
87	Forest Defence Groups	Spain

88	Special Plan for the Upper Guadiana (SPUG)	Spain
89	Hydrologic-Forestal National Plan in Ebro Catchment	Spain
90	Hydrologic-Forestal National Plan in Tajo Catchment	Spain
91	Hydrologic-Forestal National Plan in Almanzora Catchment	Spain
92	Hydrologic-Forestal National Plan in Ebro and Duero Catchment	Spain
93	Hydrologic-Forestal National Plan in Tajo Catchment	Spain
94	Aguas Font Vella y Lanjarón S.A.	Spain
95	Land stewardship project - Obra Social la Caixa de Cataluña	Spain
96	Mature forest reserves	Spain
97	A voluntary agreement for river regime restoration services in "el Bajo Ebro"	Spain
98	“Love the Forest”-City of Gothenburg (Göteborg), Region Västra Götaland	Sweden
99	The Swedish performance payment scheme for carnivore conservation	Sweden
100	Basel drinking water suppliers	Switzerland
101	Baden Forest & Brewery Müller AG	Switzerland
102	Forest Lab Zürich	Switzerland
103	Oberallmig Climate Protection Project	Switzerland
104	Payments for drinking water from forested catchments Canton Basel-Stadt	Switzerland
105	Forest Therapy Rheinfelden	Switzerland
106	Bassenthwaite Vital Uplands	United Kingdom
107	Environmentally Sensitive Area (ESA) Scheme	United Kingdom
108	Countryside Stewardship Scheme (CSS)	United Kingdom

The selection process was focused on choosing archetypes of PES and PES-like mechanisms that reflect key contexts and models across Europe, rather than attempting to represent the full spectrum of experiences. This careful selection ensured that the chosen case studies provided the essential data needed to assess the operational structures, design elements, and institutional frameworks critical to the theoretical model. This allowed us for a meaningful analysis, revealing patterns, barriers, and opportunities within the European PES landscape.

3.1.2 Application of theoretical framework on PES case studies

The theoretical framework employed in this process was developed based on the critical analysis by Hejnowicz et al. (2014), which evaluates PES programs using a Capital Asset Framework (CAF). This framework was constructed by systematically reviewing and consolidating existing PES literature, describing specific projects and their outcomes, and identifying barriers to PES adoption along with opportunities to enhance project success. Hejnowicz and colleagues built upon the foundational work of Wunder et al. (2008), Daniels et al. (2010), and Pattanayak et al. (2010), integrating the CAF approach to provide a more nuanced evaluation of PES project management interventions. The CAF framework examines the interplay between different types of capital—human, social, natural, financial, and institutional—and their influence on PES outcomes. The framework is structured into four main components:

a) Deconstruction of PES arrangements:

This component analyzes the operational, implementation, design, and institutional aspects of the analyzed PES cases (Table 3). It has been completed in the first phase of the data collection (Application of the Theoretical Framework for Data Extraction and Analysis). The following parts were fulfilled in the second phase (In-depth Evaluation of Selected Case Studies) of the data collection.

Table 3: PES arrangements key factors

No	Factors
1	PES Type
2	PES Timeline
3	ES Category (MEA)
4	ES Category (CICES)
5	Country(ies)
6	ES buyer
7	ES provider/seller
8	ES direct beneficiary(ies)
10	Project Initiator

11	Intermediary
12	PES Business Model
13	Conditionality
14	Monitoring
15	Case study area (ha)

b) Capital asset analysis:

This section assesses the impact of PES projects on the various forms of capital, as outlined in the section 2.3.5.

c) Financial structures:

Information on funding sources, financial management, and resource distribution.

d) Identification of barriers and opportunities:

This component identifies obstacles to the adoption of PES schemes and explores opportunities for enhancing project design and implementation.

These factors and components of the framework were integral in guiding the systematic data extraction from the selected PES cases, allowing for a detailed and structured analysis of each project's effectiveness and the broader implications for PES program success. The list of the considered factors in the theoretical framework can be found in Table 3 and more details in the Deliverable 2.1.

3.1.3 Information gathering for In-depth case studies

From the database of selected case studies (Table 2), we identified a subset of cases for further investigation through online questionnaires and interviews. The cases were selected to encompass a wide variety of ecosystem services, geographical locations, and project timelines, including differences in start years and durations. We also included 2 additional cases that are not yet listed in the database, BourSE and Para la Manchuela, mainly for the reason of geographical distribution, project's characteristics and respondent's availability. This broad range of cases provided a well-rounded perspective, allowing for a thorough evaluation across various contexts and conditions.

a) Development of survey/interview guidelines

The survey was designed to gather comprehensive information on several critical aspects of PES projects. It sought to provide insights into how the projects impacted various forms of capital human, social, natural, financial, and institutional. Additionally, the survey aimed to capture detailed information on financial structures, focusing specifically on the two main funding sources in Europe: European Union Funding Programs and the State Aid Framework. It also explored experts' perceptions of the barriers encountered and potential strategies for enhancing project effectiveness. Furthermore, the survey included questions about future considerations, specifically how anticipated climate scenarios might influence their PES projects (whose information will be utilised in Task 4.1 in WP4). The responses were initially collected through a Likert scale, which allowed participants to express the extent of their agreement or disagreement with various statements. After this, open-ended questions were presented to enable participants to expand on their answers, offering more detailed explanations, insights, or personal perspectives related to each specific item on the Likert scale. This combination of quantitative and qualitative data collection ensured a more comprehensive understanding of the participants' views and experiences. Designed for clarity and relevance, the survey was estimated to take approximately 30 minutes to complete.

b) Survey distribution and selection criteria:

To encourage participation, the questionnaire was made available in English, French, and Italian. 26 cases were selected, but only 11 responded, and 9 completed the questionnaires, with 2 of these also participating in the interviews. The final 9 case studies examined for detailed analysis are as it shows in Table 4:

Table 4: Selected in-depth case studies

Case Study	Country	Area size (ha)	Duration	ES (CICES)
Drinking water protection zone Weidhofen/Ybbs	Austria	30	2018-present	Water regulation
Eerste Vlaamse Houtpark	Belgium	N/A	2019-present	Fibre Provision
Rusenski Lom pilot site	Bulgaria	N/A	2010-present	Recreation and ecotourism

BourSE	France	N/A	2024-present	Carbon sequestration, co benefits for biodiversity + cultural ES
Waldaktie (Forest Shares)	Germany	2317.4	2007-present	Climate regulation
Bioclima initiative	Italy	300	2022-present	Recreation and ecotourism
The Green Heart of Cork project	Portugal	600	2011-present	Fibre provisioning
Para la Manchuela y el planeta	Spain	N/A	2019-present	Climate regulation
Love the Forest	Sweden	N/A	2016-present	Educational

These selected projects represent a diverse array of initiatives across Europe, capturing a broad range of regional contexts and approaches, as well as diverse geographical and institutional settings across the continent. The **Drinking Water Protection Zone Waidhofen/Ybbs** in Austria is a project designed to safeguard water quality through sustainable land-use practices, particularly within vulnerable drinking water protection areas. The **Eerste Vlaamse Houtpark** is an innovative project aimed at promoting sustainable forest management and timber production through a transparent and environmentally responsible framework in Belgium. The project at **Rusenski Lom Nature Park** in Bulgaria focuses on preserving biodiversity by promoting sustainable practices in agriculture, forestry, and tourism, while establishing a local Conservation Fund to support the park's management and protect endangered species. The **BourSE** project in France focuses on enhancing biodiversity and ecosystem services by integrating sustainable land-use practices with economic incentives, particularly in agroforestry systems. Germany's **Waldaktie** initiative encourages public participation in forest conservation by allowing individuals and organisations to contribute to reforestation efforts. The **Bioclima** Initiative in Italy focuses on enhancing ecosystem services through nature-based solutions, encouraging sustainable development and climate adaptation. The **Green Heart of Cork** is a WWF initiative in Portugal focused on the conservation and sustainable management of cork oak landscapes, which are critical habitats for a variety of species and play a significant role in preventing desertification. **Para**

la Manchuela y el Planeta aims to combat climate change by promoting sustainable agricultural practices and fostering community involvement in environmental stewardship in Spain. Lastly, **Love the Forest** in Sweden is a community-driven initiative that supports forest conservation through innovative funding mechanisms, fostering local engagement and environmental awareness (Table 5).

Table 5: Demographic overview and response summary of participants

ID	Category	Role	Questionnaire submission/interview date
1	Academia	Specialist in the thematic field	15 July 2024 (Q) and 23 July 2024 (I)
2	Academia	External supporter to the implementing organisation	16 July 2024 (Q and I)
3	Non-governmental organisation	Project manager	25 July 2024 (Q)
4	Scientific research	Member of the implementation team	2 August 2024 (Q)
5	Academia	External supporter to the implementing organisation	2 August 2024 (Q)
6	Public administration	Participant contact for one of the case studies	6 August 2024 (Q)
7	Forest organisation	External supporter to the implementing organisation	7 August 2024 (Q)
8	Public administration	Project manager	8 August 2024 (Q)
9	Non-governmental organisation	Admin support to the implementation	6 September 2024 (Q)

Table 5 above describes the panel of respondents, which consisted of a diverse group of professionals with pivotal roles in the implementation and support of the PES and PES-like

projects outlined above. This group included specialists from academia, non-governmental organisations, scientific research, public administration, and forest organisations. Their roles in the project ranged from thematic field experts, external supporters to implementing organisations, project managers, to members of implementation teams. The questionnaires were submitted between mid-July and early August 2024, with two respondents also participating in follow-up interviews to provide deeper insights.

c) Follow-up interviews

Following the survey phase, semi-structured interviews were conducted via Zoom or in person with selected respondents where important information was identified for further exploration, or where survey answers were unclear and required additional elaboration. These interviews provided qualitative insights for clarity and added valuable context to the survey responses. The candidates were selected based on their direct involvement in the PES projects to ensure they had a good understanding of the project's processes and outcomes.

3.2. Data analysis

3.2.1. Analysis of database of PES case studies

The analysis of the database was conducted first, involving data from 108 PES case studies sourced from various projects. Using the theoretical framework developed in Task 2.1, detailed information on the operational arrangements, design features, and institutional setups of each PES project was systematically extracted. This data was then analyzed using MS Excel to compare various factors across the case studies. Specifically, Excel was used to assess frequency analysis, identifying how often specific factors or characteristics appeared across the case studies. Also, the relationship between selected actors has been analyzed for all 27 EU countries plus UK and Switzerland included in the database. Countries without available data have been excluded from this analysis. This approach facilitated a thorough evaluation by providing insights into the distribution and interrelation of factors across the case studies.

3.2.2. Analysis of In-depth case studies

The quantitative data from the surveys were analysed using MS Excel, focusing on responses to Likert scale questions related to PES capital assets and funding landscapes. For the qualitative analysis, we used Atlas.ti 23 to systematically code and interpret responses from open-ended questions in the questionnaires and interview transcripts. The data were analysed through an iterative process of coding. First, initial codes were assigned to parts of the data to capture important ideas or themes. These initial codes were then reviewed and grouped into more focused categories based on patterns or common themes shown in Table 6 below. The main categories that emerged were opportunities and barriers, both relevant to the study's objectives. This comprehensive approach integrated both quantitative and qualitative insights, offering a nuanced understanding of the PES projects.

Table 6: The reviewed coding categories in Atlas

Opportunities	Capacity building
	Communications
	Financial guarantees
	Implementation
	Legal framework
	Inclusive participations
Barriers	Bureaucracy
	Communications
	Conflict of interest
	Financial constraints
	Implementation constraints
	Participation issues
	Scale/time constraints

4. Results

In this chapter, a comparative assessment of the analysed case studies is presented, focusing on their key characteristics and contexts to identify overarching patterns across the dataset. Additionally, we have analyzed the relationship between various factors within the case studies, offering a comprehensive understanding of how different elements might be linked. Next, we delve into the findings from the survey and interviews, analysing the data collected from expert responses to gain insights into the various aspects of the PES case studies. Finally, we explore the perspectives shared by these experts, summarising the valuable insights and conclusions drawn about the effectiveness and impact of PES initiatives. This offers a comprehensive understanding of the PES landscape and the factors influencing project outcomes in Europe.

4.1. Overview of PES cases from the Database

In this section, we present a summary and analysis of the data collected from the representative 108 PES case studies across Europe. We highlight key findings and trends observed in these cases categorised based on two arrangements, "Operational and implementation arrangements" and "Design and institutional arrangements", focusing on various individual factors as well as their relations. (Table 2**: Selected Case studies**).

4.1.1. Operational and implementation arrangements´ factors

a) ***PES type***

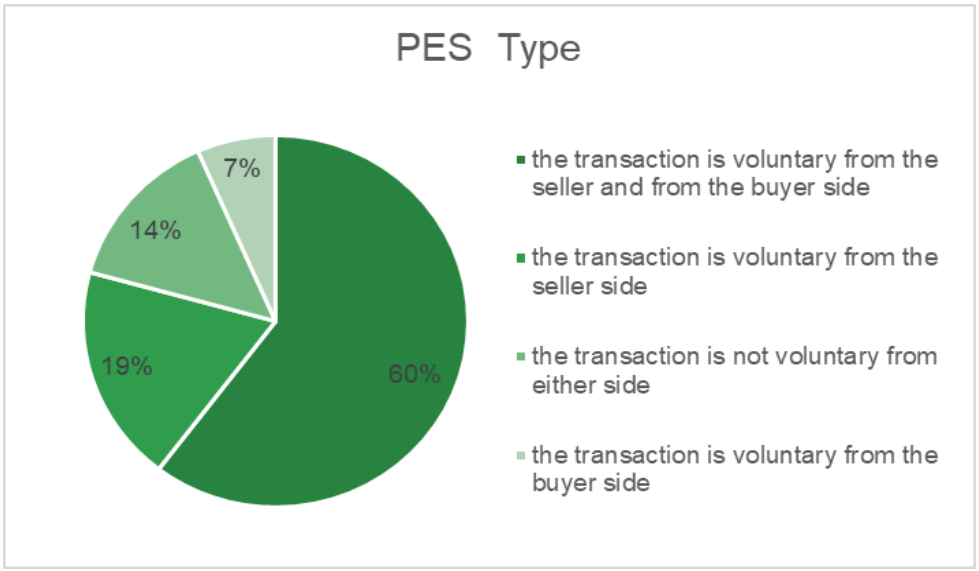


Figure 3: Type of PES scheme of analyzed case studies [n=108]

The analysis of the selected case studies across Europe reveals that in the majority of the cases (60%), both the buyer and seller voluntarily engage, indicating a strong preference for mutual agreement. However, in 19% of cases, only sellers have the option to participate voluntarily, while in 7% of cases, only buyers have that choice. Notably, 14% of transactions are involuntary for both parties. (Figure 3).

b) ***Timeline of analysed PES cases***

The analysis of the starting years of PES schemes across Europe based on the available data for 96 cases reveals a progressive expansion from early implementations to widespread adoption. Initial schemes surveyed with this study began with Switzerland in 1920 and Spain between 1940 and 1950. Within our dataset, the momentum grew significantly in the 1990s, with Germany leading multiple initiatives from 1987 to 1995, and other countries such as the United Kingdom, France, Denmark, and Belgium joining in. The early 2000s saw further growth, with the Czech Republic, Portugal, and Bulgaria initiating schemes from 2004 to 2010, and Italy becoming notably active from 1997 onwards. In recent years, from 2011 onward, new schemes have been established in Austria, France, Ireland, and Slovenia-Croatia, with Finland and Sweden adding to the list in 2016. The most recent initiatives in 2022 have seen multiple schemes in Italy, reflecting an ongoing and expanding commitment to PES across the continent (Figure 4).

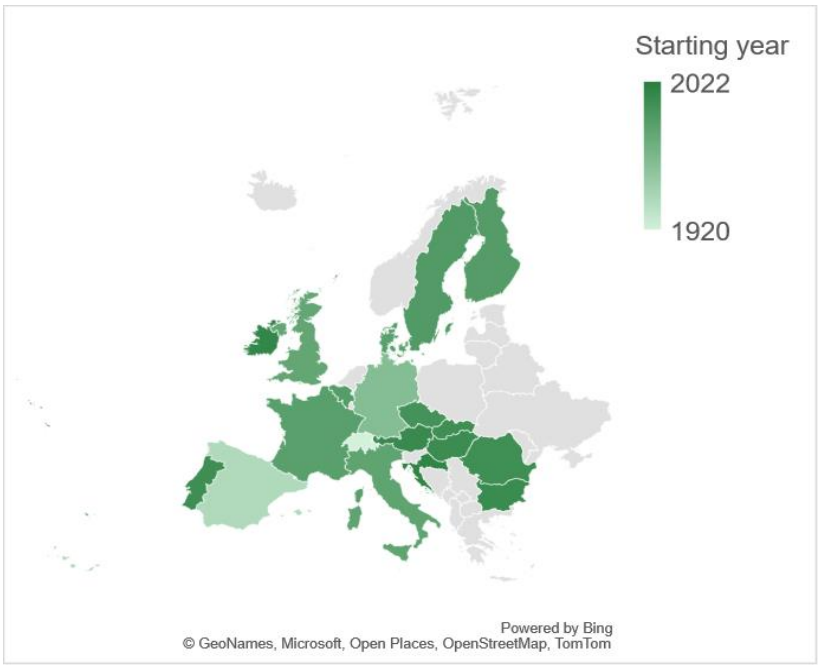


Figure 4: Starting year of PES schemes across Europe of analyzed case studies [n=96]

The analysis of the duration of completed PES case studies, based on the available data for 22 cases out of a total of 108 (20%), reveals a varied range of project lengths. The majority (40.9%) of these case studies (9 cases), lasted less than 10 years, indicating a trend towards shorter-term initiatives. A moderate duration is reflected in the 27% of cases (6 case studies) that lasted between 10-19 years. There are 4 cases (18%) with durations between 20-39 years, while 1 case (4.5%) lasted between 40-49 years. Notably, 2 case studies (9%) extended beyond 50 years, demonstrating long-term commitments. This distribution highlights that while most analyzed PES cases tend to be short-term, a small but notable portion extends over longer durations, emphasising sustained environmental efforts (Figure 5).

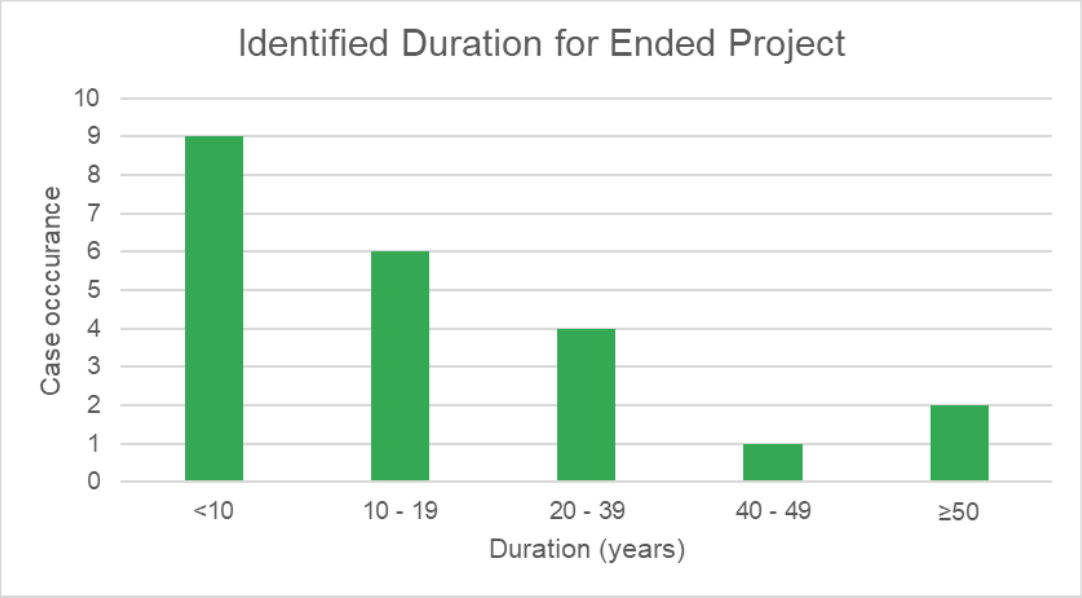


Figure 5: Analysis of the completed case study´s duration of analyzed case studies [n=22]

The analysis of the duration of the analyzed PES cases, focusing on both completed and ongoing initiatives across different ecosystem service categories where duration data is available (Figure 6), reveals clear pattern. Out of the total 108 cases, duration information is available for 22 cases (20%).

Case studies lasting less than 10 years are predominantly focused on regulating services, which account for 67% (6 out of 9 cases) of this category. Cultural services follow with 22% (2 cases), and provisioning services make up the remaining 11% (1 case).

In the 10 to 19 years range, projects are evenly split between regulating and cultural services, each representing 50% (3 out of 6 cases) of the projects in this duration.

For projects with durations of 20 to 39 years, 50% (2 out of 4 cases) focus on regulating services, 25% (1 case) on provisioning services, and 25% (1 case) on cultural services.

The 40 to 49 years category is exclusively dedicated to regulating services, which make up 100% (1 case) of the projects in this timeframe.

Finally, in the longest duration category of 50 years or more, the projects are equally split between regulating and cultural services, each accounting for 50% (1 out of 2 cases).

This distribution underscores the dominance of regulating services across various case studies durations, with cultural services also playing a significant role, particularly in longer-term projects. Provisioning services are less frequently associated with longer durations, while supporting services are not represented in the data available.

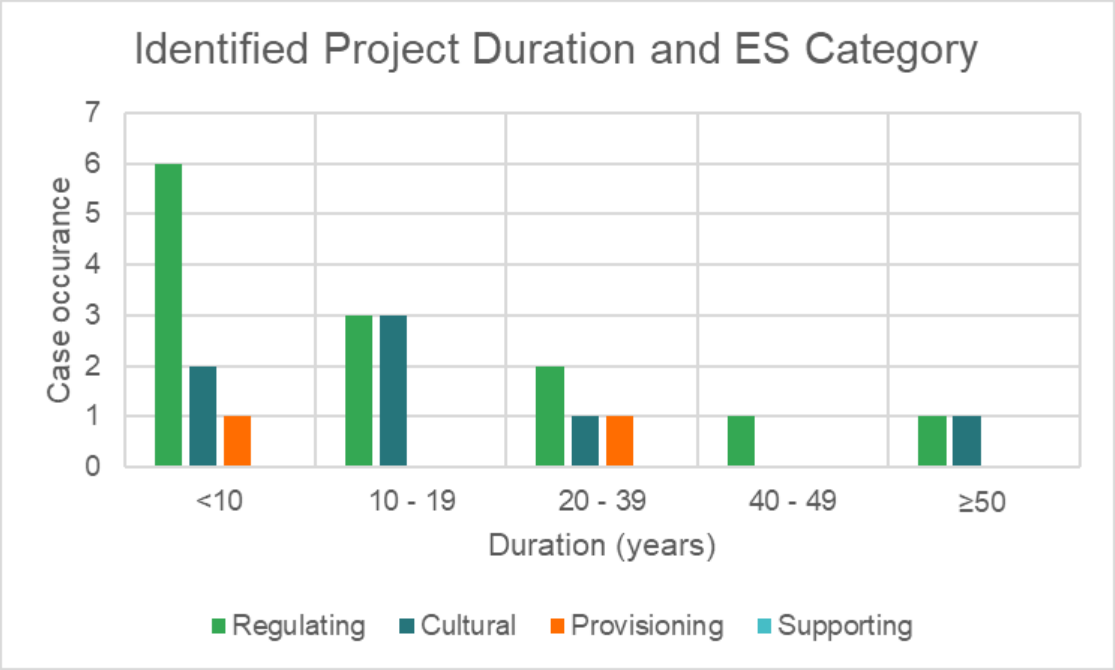


Figure 6: PES case study duration based on ecosystem services types of analyzed case studies [n=22]

c) *Ecosystem services Type*

Based on the analysis of marketed **ecosystem services according to the CICES** (Common International Classification of Ecosystem Services) categorization and considering the total number of case studies (108), water regulation emerges as the most significant service, accounting for 28% of the cases, highlighting its crucial role in managing water resources and maintaining ecological balance. Recreation and ecotourism follow with 17%, reflecting their importance in providing leisure opportunities and fostering environmental appreciation.

Water purification also holds a notable position at 13%, underscoring its essential function in ensuring clean water. Genetic resources come next with 14%, emphasising their value in biodiversity and resource conservation. Fibre accounts for 7%, indicating its significance in supplying essential materials. Climate regulation is less emphasised at 6%, though it remains important for stabilising the climate. Services such as spiritual and religious, aesthetic, educational, and cultural heritage have lower percentages, suggesting they play a less central role compared to the more critical regulatory and provisioning services. Overall, this distribution underscores a strong focus on regulatory services, particularly water management, alongside significant attention to recreational and provisioning services, with cultural heritage and educational services being less prioritised (Figure 7).

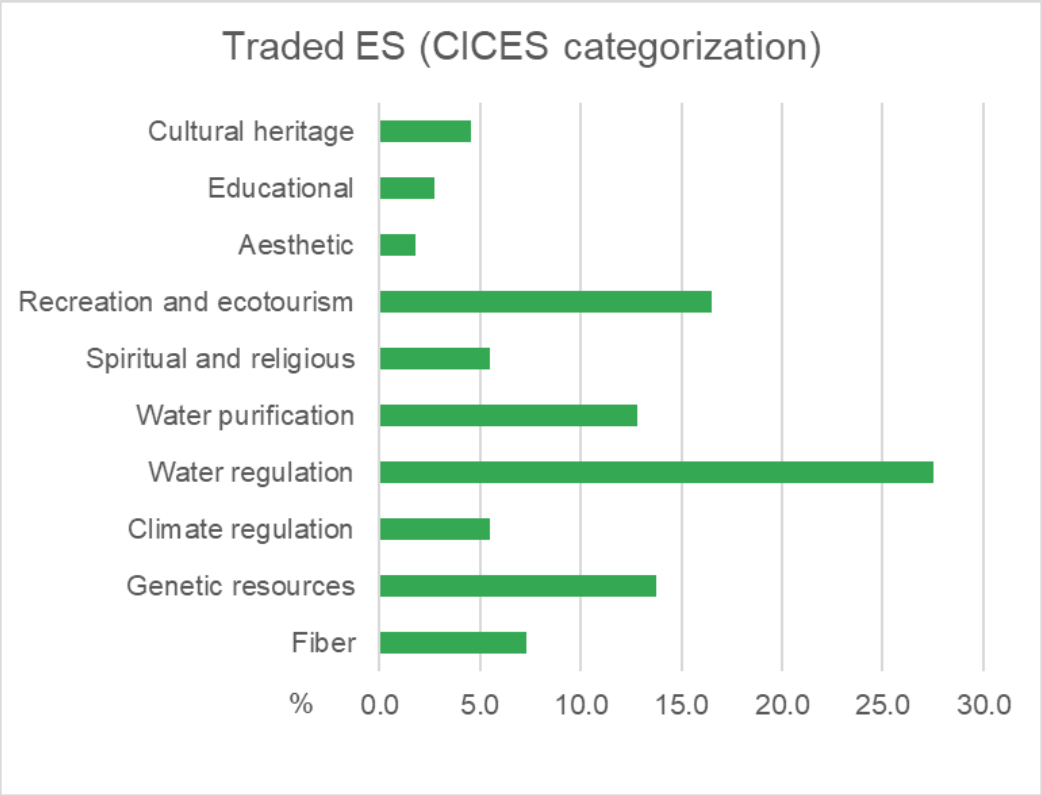


Figure 7: Ecosystem services type according to CICES classification of analyzed case studies [n=108]

Based on the analysis of ecosystem service types of categorisations by the MEA (Millennium Ecosystem Assessment, 2005), the analysis reveals that regulating services dominate, making up 60% of the cases, reflecting their crucial role in maintaining environmental stability through functions like water regulation. Cultural services follow at 22%, highlighting the importance of ecosystems in providing recreational, spiritual, and cultural benefits. Provisioning services, which include the production of essential resources like food and water,

account for 13% of the cases. Supporting services, foundational for all other ecosystem functions, represent the smallest share at 5%. This distribution underscores the significant focus on regulating services within the studied and marketed ecosystem services (Figure 8).

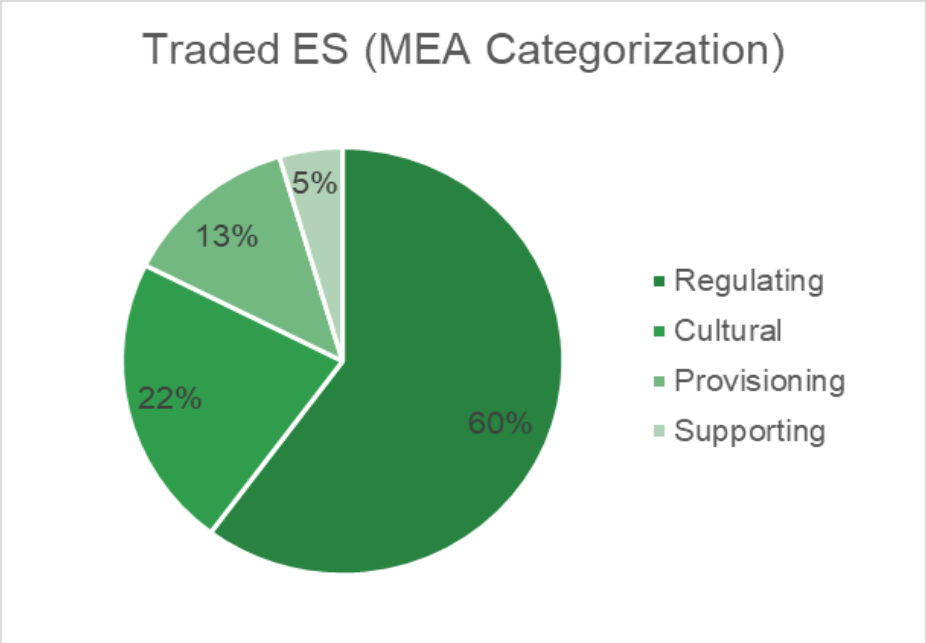


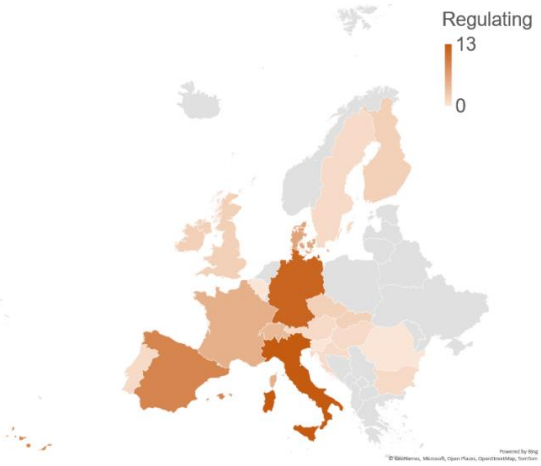
Figure 8: Ecosystem services type according to MEA classification of analyzed case studies [n=108]

In the analysis of marketed ES across various European countries based on MEA, regulating services emerge as the most prominent, comprising 65 cases or 60% of the total. Germany and Italy are particularly active in this category. Germany, with 17 total cases, devotes 76% (13 cases) to regulating services, underscoring its significant focus on ecological processes such as water management to maintain ecosystem balance and mitigate natural hazards. Italy, leading with 28 total cases, contributes 46% (13 cases) to regulating services, reflecting its commitment to similar environmental priorities.

Cultural services follow with 24 cases, making up 22% of the total. Italy once again stands out with 9 of its 28 cases (36%) dedicated to cultural services. Germany also contributes to this category, with 2 of its 17 cases (12%) focused on cultural services, highlighting the importance of cultural values in these countries' ecosystem management strategies.

Provisioning services, which deal with the supply of natural resources, account for 14 cases or 13% of the total. Italy and Belgium each have 3 cases (3% of the total), reflecting moderate involvement in resource management. Germany, contributing 2 cases (12% of its total), shows a balanced approach across various ES categories.

Supporting services, foundational to all other ecosystem services, are the least represented, with only 5 cases, making up 5% of the total. Finland and Italy each contribute 2 cases, while Germany adds 1 case to this category, indicating a lesser emphasis on these foundational services in marketed ES.



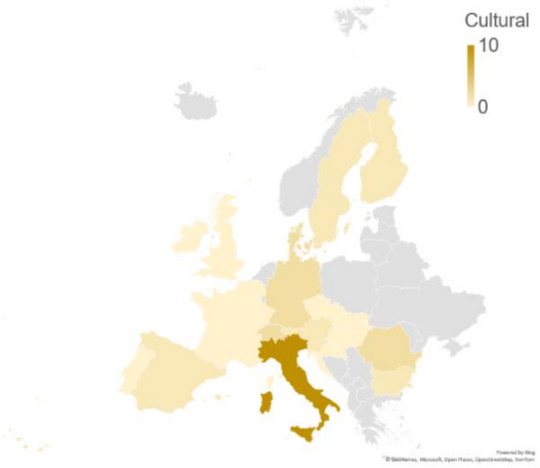
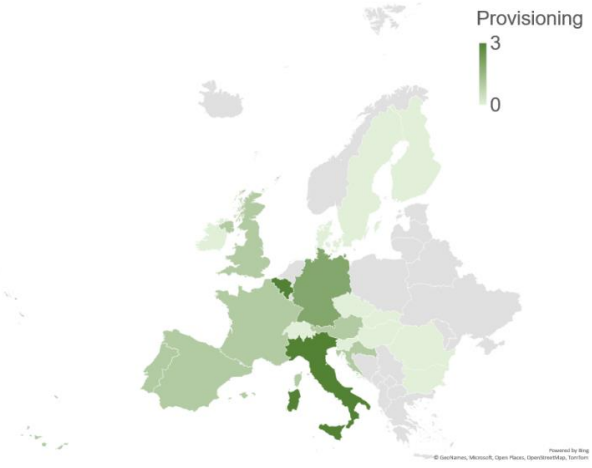


Figure 9: Number of case studies focusing on regulating ES across countries in Europe [n=65] **Figure 10: Number of case studies focusing on Cultural ES in Europe [n=65]**



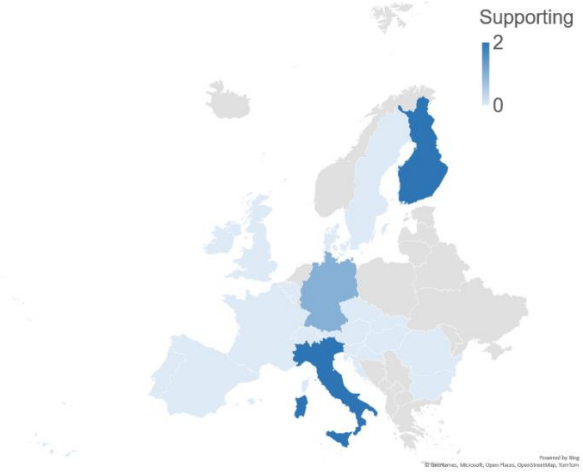


Figure 11: Number of case studies focusing on provisioning ES across countries in Europe [n=65] **Figure 12: Number of case studies focusing on supporting ES across countries in Europe [n=65]**

Countries like Austria, Portugal, and Switzerland exhibit a more balanced distribution across multiple service types, while others such as Bulgaria, Slovakia, and Sweden focus on fewer

services. Slovenia and Hungary contribute with only 1 case each in cultural and regulating services, respectively, reflecting either a limited focus or fewer available data points.

Overall, the distribution of marketed ES highlights a predominant emphasis on regulating services in Germany and Italy (60.2%), significant attention to cultural services in Italy (22.2%), and provisioning services in both Italy and Belgium (13.0%). Supporting services, however, receive relatively less focus across Europe, with Italy and Finland presenting some notable cases (64.6%). This pattern reflects the diverse ecological priorities and resource availability across the studied European countries (Figure 9, Figure 10, Figure 11, Figure 12).

4.1.2 Design and institutional arrangements factors

a) Stakeholder mapping

As shown in Figure 13, the distribution of ES buyers by type reveals that public administrations are the most prominent, comprising 38% of all ES buyers. This is followed by private-for-profit organisations, which account for 28%. Private citizens make up 22%, while civil society organisations contribute 4%. Higher education and research organisations represent 1%, and the 'other' category accounts for 7%. This distribution underscores the leading role of public administrations and the private sector in paying for ES, with private citizens also playing a significant role.

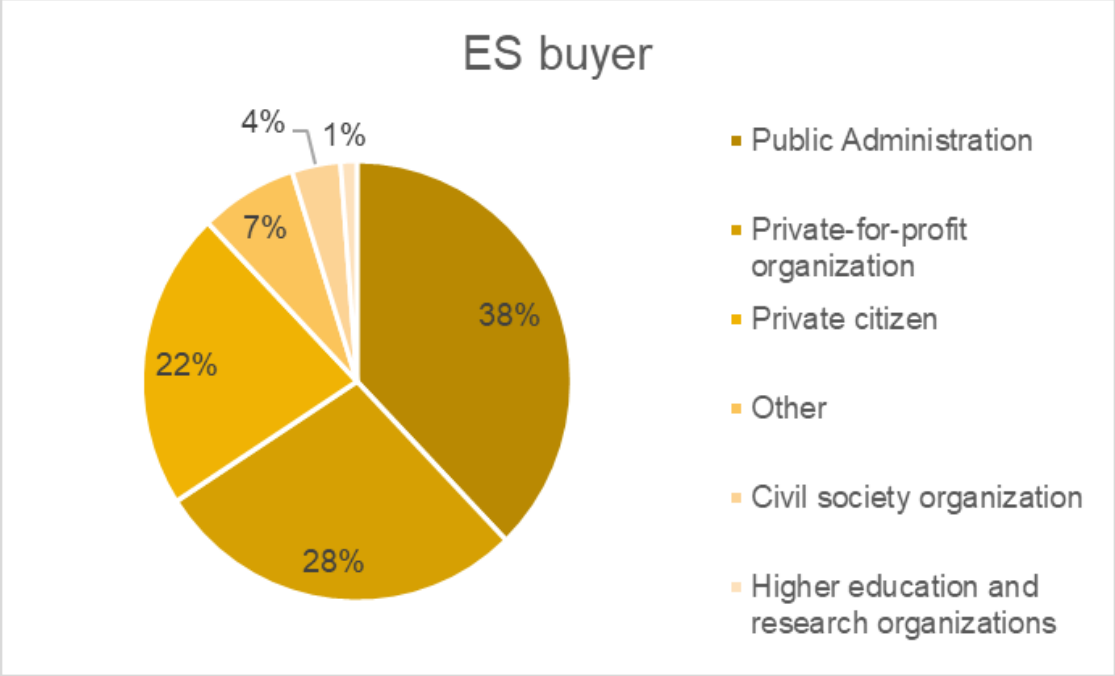


Figure 13: Number of case studies by type of buyers of analysed PES cases [n=108]

As illustrated in Figure 14, the distribution of ES providers or sellers by type reveals notable patterns. Private citizens are the most prominent, accounting for 42% of all ES providers. This is followed by both public administrations and private-for-profit organisations, each contributing 24%. Civil society organisations account for 4%, while the "other" category makes up 6% of the providers. Higher education and research organisations are not represented as ES providers in this dataset. This distribution highlights the significant role of private citizens in providing ES, alongside public administrations and the private sector.

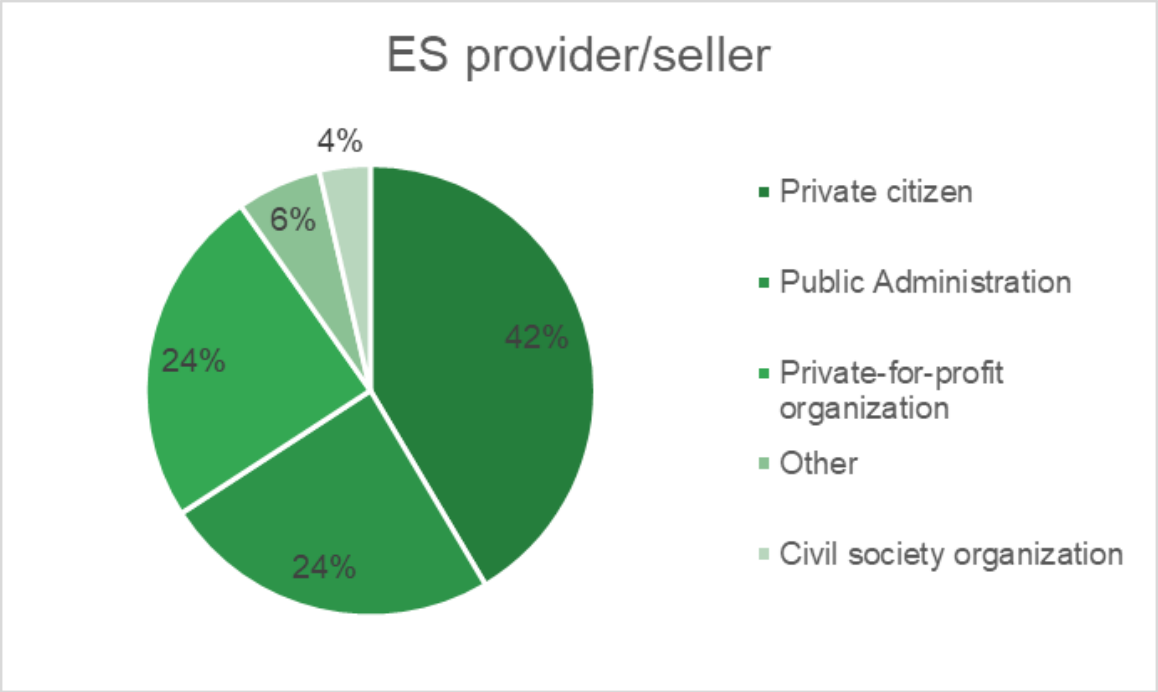


Figure 14: Number of case studies by type of provider/seller of analysed PES cases [n=108]

As shown in Figure 15, the distribution of direct beneficiaries of ES by type reveals clear trends. Private citizens are overwhelmingly the most prominent, accounting for 70% of all direct beneficiaries. Private-for-profit organisations follow, representing 21% of beneficiaries. Civil society organisations make up 5%, while public administrations account for 4%. Higher education and research organisations and the "other" category are not represented as direct beneficiaries in this dataset which might relate to the lack of available data. This distribution underscores the significant role of private citizens as the primary direct beneficiaries of ecosystem services, with private sector entities and civil society organisations also playing important roles.

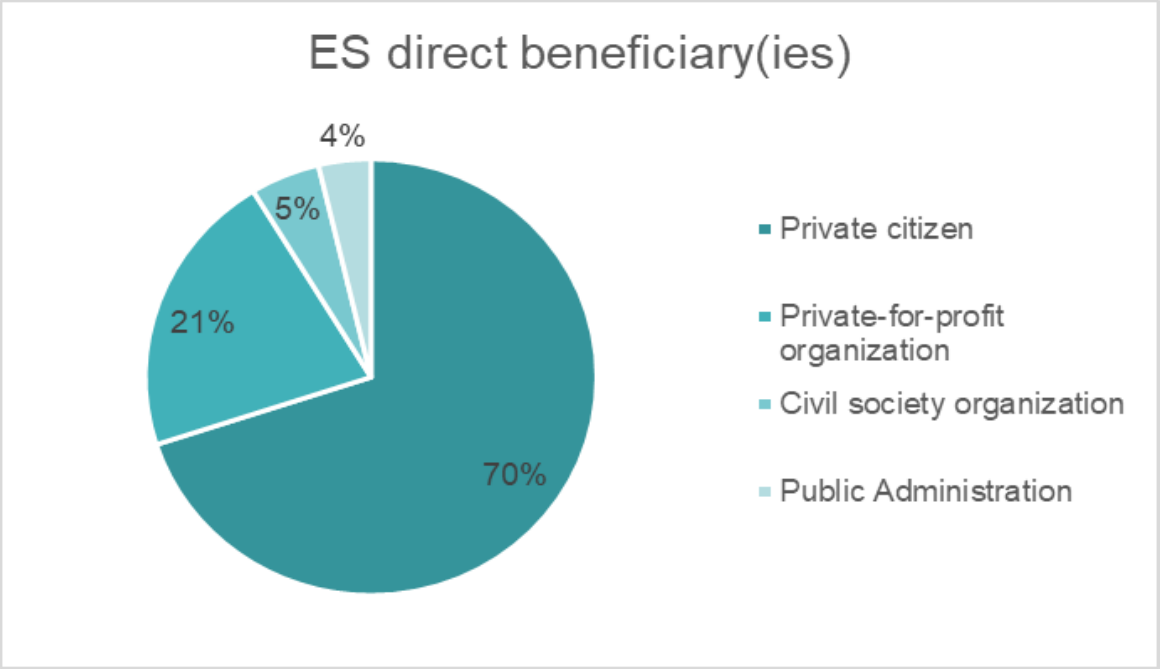


Figure 15: Number of case studies by type of direct beneficiary of analysed PES cases [n=108]

As depicted in Figure 16, the distribution of ES providers across various the 96 analyzed cases with available data shows notable patterns. Public administrations dominate the landscape, accounting for 52% of the total providers. Civil society organisations and private-for-profit organisations each represent 17% of the providers, indicating their significant involvement. Higher education and research institutions contribute 4%, while private citizens make up a smaller portion at 2%. Additionally, 8% of the cases involve a mix of these provider types. This distribution highlights the dominant role of public administrations in providing ecosystem services, with substantial contributions from civil society and the private sector.

Figure 17 illustrates the distinct patterns observed in the role of intermediaries in ES transactions. Public administrations play the most significant role, making up 28% of the intermediaries involved. Civil society organisations follow at 10%, highlighting their involvement in facilitating ES transactions. Private-for-profit organisations account for 3%, while both higher education and research institutions and private citizens each represent 1% of intermediaries. Additionally, 2% of cases involve a mix of these provider types. Notably, 55% of the cases operate without intermediaries, indicating a direct relationship between ES providers and beneficiaries in the majority of cases.

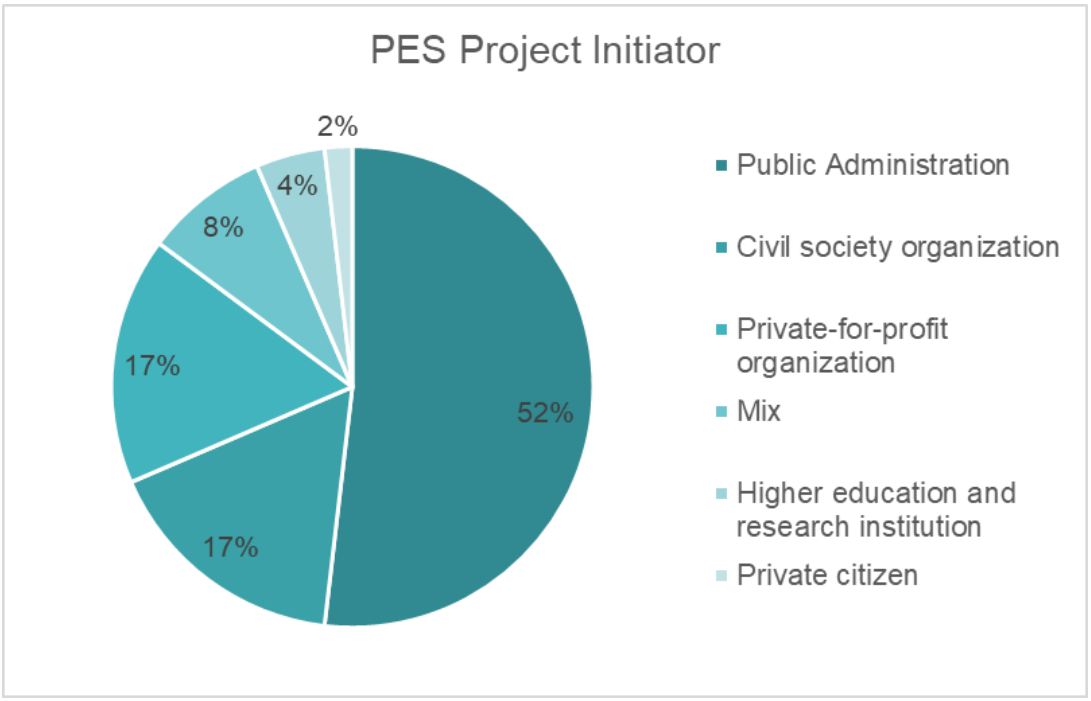


Figure 16: Number of case studies by type of initiator of analysed PES cases [n=94]

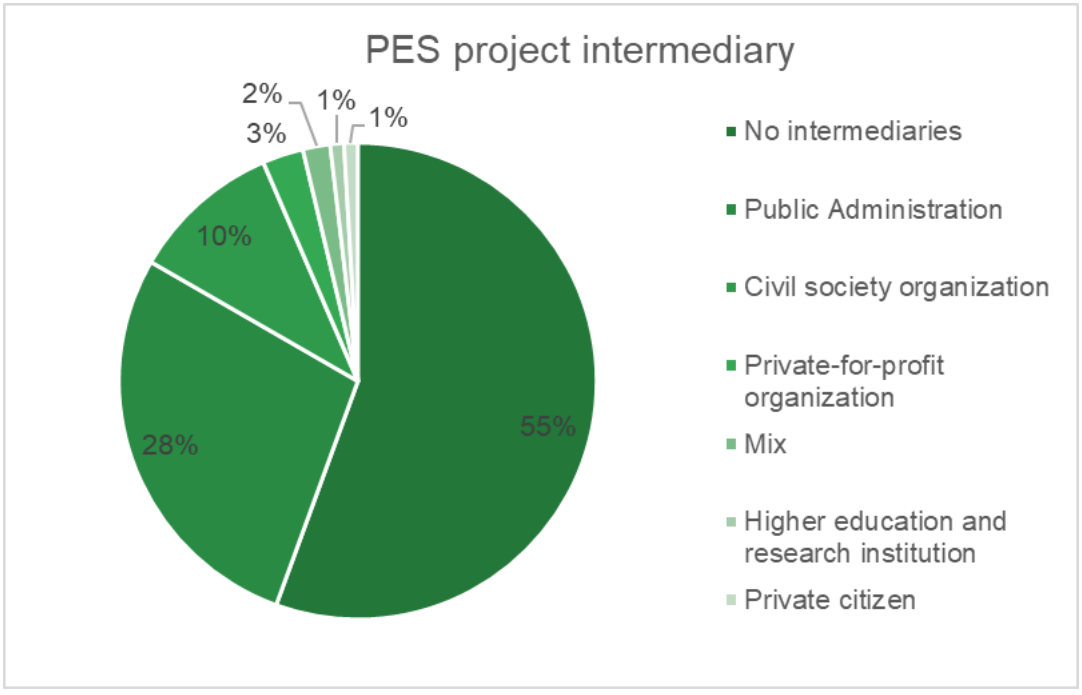


Figure 17: Number of case studies by type of direct beneficiary of analysed PES cases [n=80]

b) PES Business Model

Figure 18 presents the distribution of PES business models across 108 case studies, categorised based on stakeholder mapping. Public-Private partnerships represent 28%, indicating collaborative efforts where both governmental and private funds support ecosystem service delivery. Private-Public arrangements make up 16%, while Public-Public payment schemes

account for 10%, where government entities compensate land managers for ecosystem enhancement on behalf of the public. The most prevalent model, Private-Private partnerships, comprises 46%, highlighting self-organised agreements between private entities without government intervention. This classification underscores the diverse mechanisms employed to finance ecosystem services.

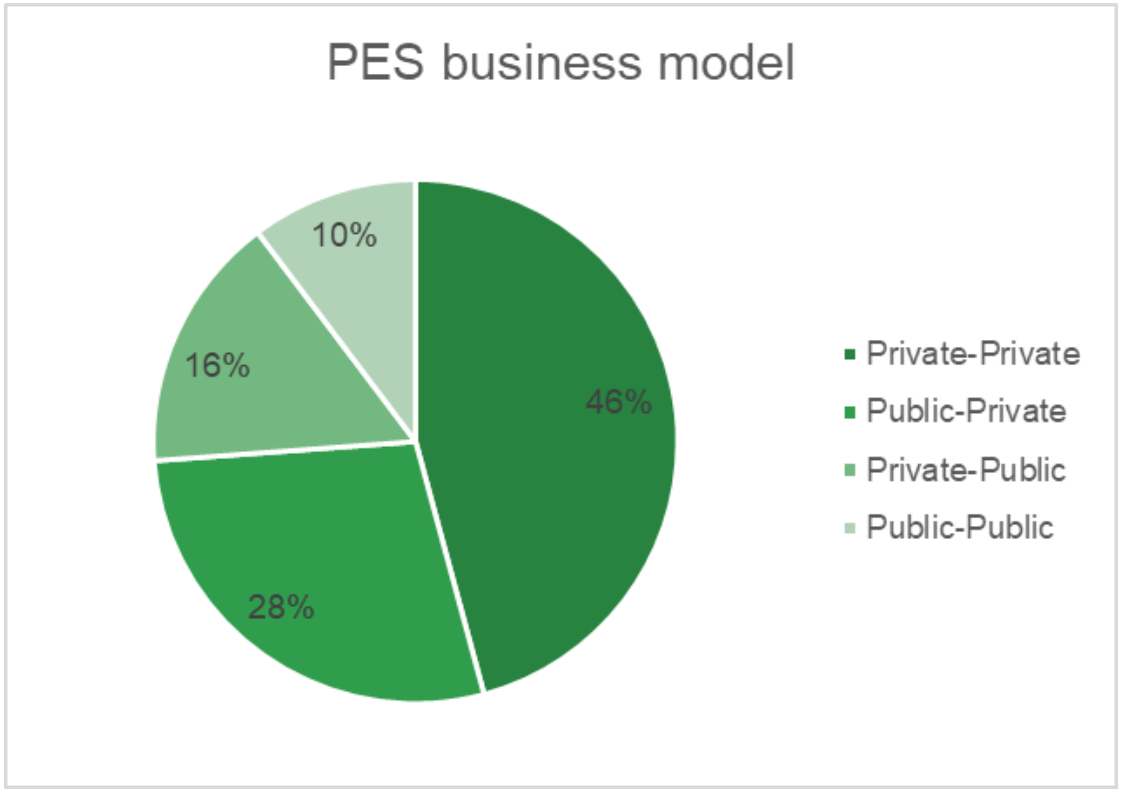


Figure 18: Number of case studies by type of business model of analysed PES cases [n=108]

c) Conditionality and Monitoring

The analysis of conditionality in PES case studies, as shown in the data, reveals that a significant majority of case studies (90%) incorporate specific conditions through a contractual agreement that providers must meet to receive compensation for ecosystem services. These conditions, which include practices such as sustainable management, monitoring, and legal compliance, ensure that the objectives of the PES case studies are achieved effectively. Only 10% of the cases do not include such conditionality, indicating that most PES projects prioritise accountability and long-term sustainability through these structured requirements (Figure 19).

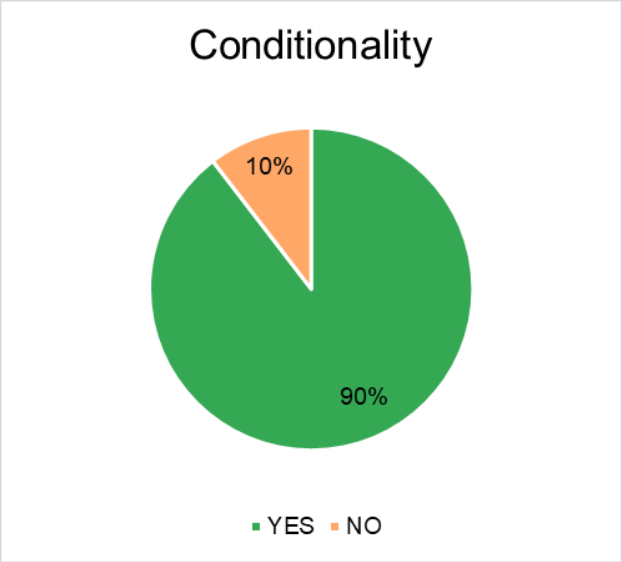


Figure 19: Number of case studies by type of conditionality of analysed PES cases [n= 97]

Figure 20 presents the analysis of monitoring in PES case studies, highlighting the importance of this practice as a key component of conditionality in ensuring case studies success. Monitoring, which involves regularly tracking and assessing the implementation of ES agreements, is a crucial component in maintaining transparency, measuring effectiveness, and ensuring compliance with the agreed-upon conditions. The data shows that 86% of the case studies incorporate monitoring mechanisms, reflecting a strong commitment to oversight and accountability. In contrast, 14% of the case studies do not include monitoring, which may pose challenges in verifying the outcomes and long-term sustainability of these initiatives.

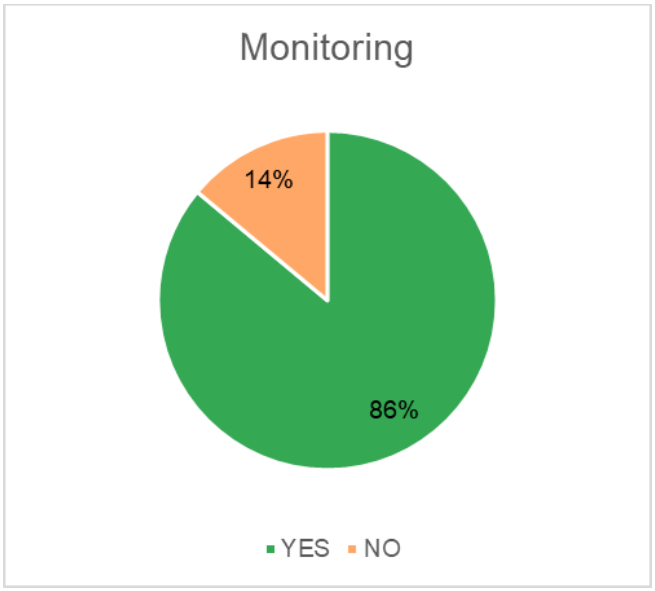


Figure 20: Number of case studies by type of monitoring of analysed PES cases [n=108] [n= 87]

4.1.3 Relation between selected factors characterising case studies

a) The PES case studies duration and the ES providers

The analysis of PES case studies durations in relation to ecosystem provider type reveals distinct patterns, as illustrated in Figure 21. However, considering that the total number of PES project cases with available duration data is 22, this analysis is partial. For case studies lasting less than 10 years, public administrations are the most involved, managing 55.6% of these case studies. Private-for-profit organisations and private citizens each handle 22.2%, while higher education and research organisations and civil society organisations have no case studies in this duration range, possibly due to data limitations.

In the 10 to 19 years range, public administrations continue to lead, handling 66.7% of these case studies. Private citizens manage 16.7%, and the remaining 16.7% are managed by other organisations. Private-for-profit organisations and higher education and research organisations have no case studies in this duration range, which may be attributed to the available data.

For case studies lasting 20 to 39 years, both private-for-profit organisations and public administrations manage 50% of the projects each. Other provider types have no case studies in this duration category, likely due to the limitations of available data.

Case studies lasting 40 to 49 years are exclusively managed by public administrations, accounting for 100% of these case studies, with no data available for other provider types in this duration range.

In the longest duration category of 50 years or more, public administrations and civil society organisations each manage 50% of these case studies. Private-for-profit organisations, private citizens, and higher education and research organisations have no case studies in this duration category, which may reflect a lack of available data.

This distribution highlights that public administrations and civil society organisations are significantly involved in managing longer-term PES projects, reflecting their capacity for sustained commitment and stability. In contrast, private-for-profit organisations and private citizens tend to focus on shorter to medium-term projects, illustrating varying levels of involvement based on project duration and operational focus.

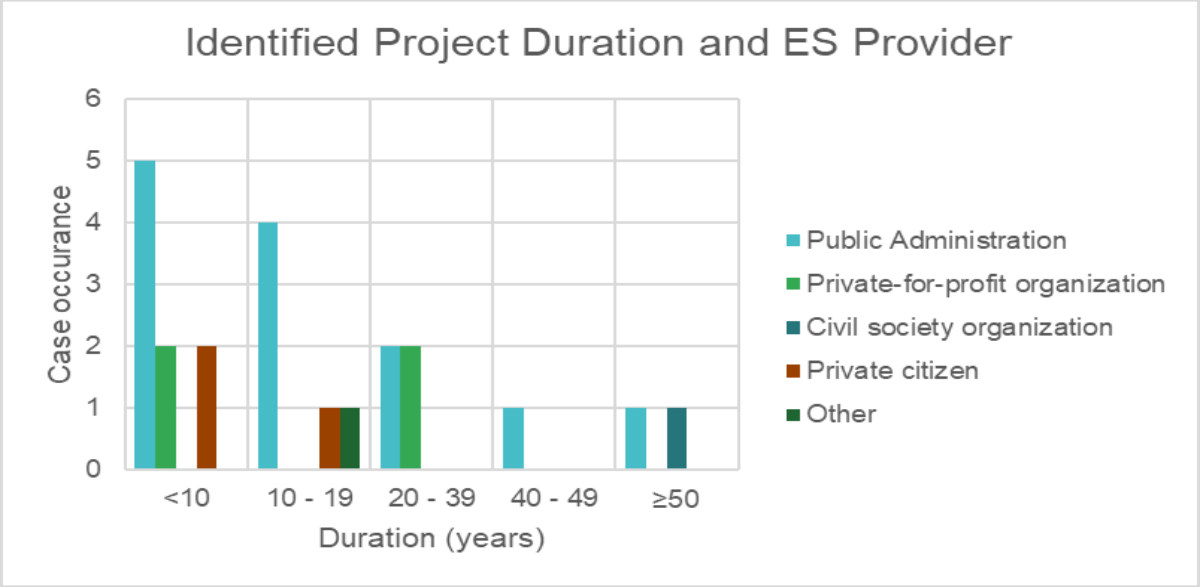


Figure 21: Relationship between PES case study durations and ecosystem provider type of analyzed case studies [n= 22]

b) The PES case study area and Ecosystem services types

The analysis of the individual case study area in categories (average, smallest and largest) in relation to the type of ES reveals some patterns on the number of cases, though statistical significance has not been assessed (Figure 22). Regulating services, which include water regulation, water purification, and flood control, dominate both in terms of total area and the number of case studies. With an average case study area of 42,722 hectares, these case studies are often implemented on a large scale, reflecting their critical role in maintaining environmental stability and the need for extensive land areas to achieve desired outcomes.

Provisioning services, which involve the production of goods like timber, food, water, and raw materials, exhibit a much higher average case studies area of 120,438 hectares, despite being the object of fewer case studies. This suggests that provisioning services are typically implemented in large-scale operations, possibly due to the need for extensive areas to sustainably produce goods like timber or freshwater.

Supporting services, which underpin other ES through processes like soil formation and nutrient cycling, have the smallest average case study area at 396 hectares, and only two case studies in total in our case study selection. This indicates that supporting services might be more localised or focused on specific, critical areas rather than broad regions or generally being less in focus/prominent.

Cultural services, which relate to the non-material benefits people obtain from ecosystems, such as recreation and spiritual enrichment, also show a relatively small average case studies area of 11,202 hectares. This suggests that usually cultural services are often managed in more specific, smaller areas, likely due to their context-dependent nature or in terms of particular infrastructure, where smaller, community-focused areas (The term "community" here refers to those who engage with and benefit from this service, rather than specifically the owners) provide significant cultural value.

The significant pattern is that larger areas are generally associated with provisioning and regulating services, where the scale of land is crucial to achieving substantial ecosystem benefits, while supporting and cultural services are more likely to be concentrated in smaller, specialised areas.

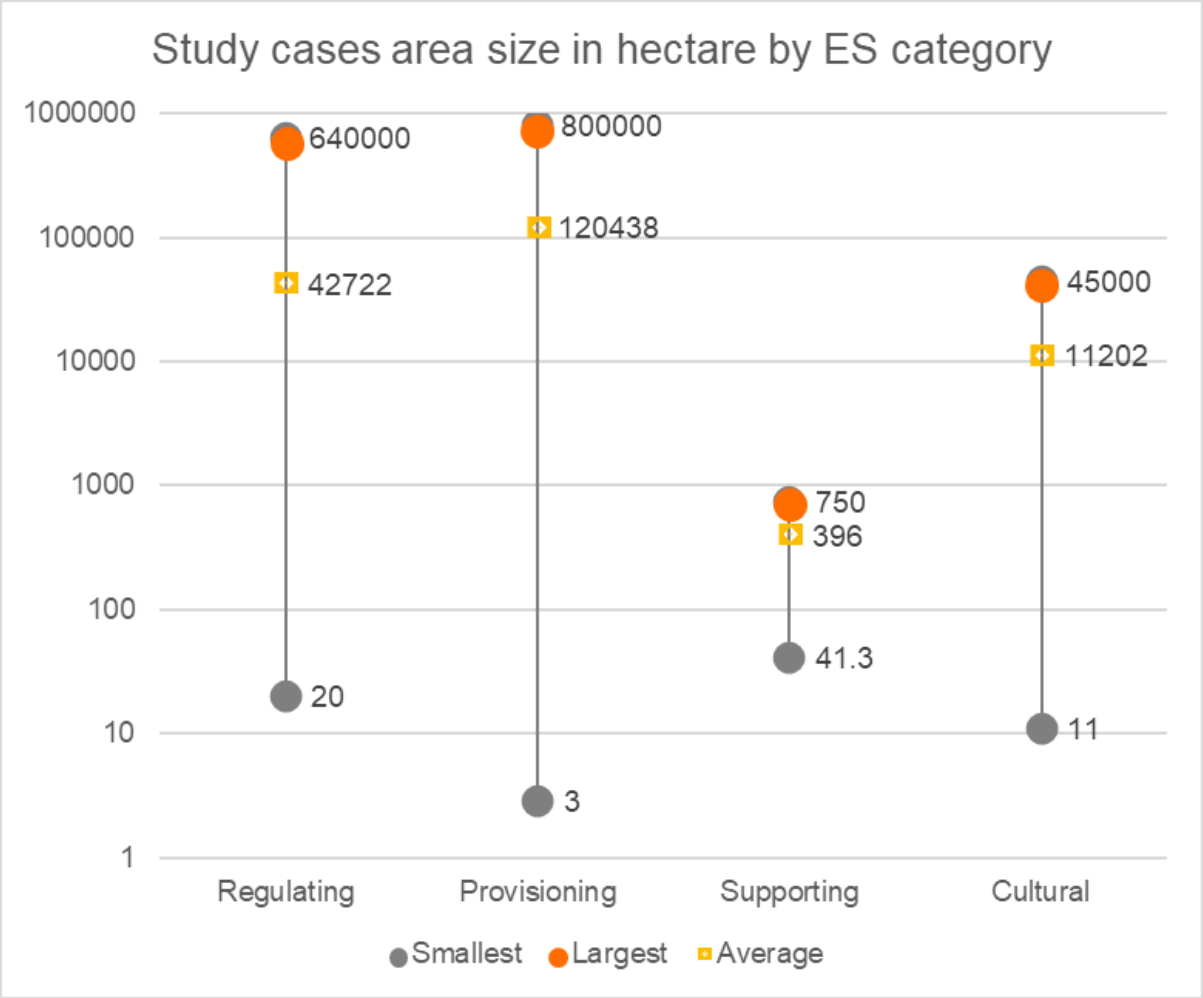


Figure 22: Area size distribution across different ecosystem services of analysed case studies [n= 87]

c) *Comparing PES case studies area across European countries*

Key observations on the PES case studies area for different ESs across European countries are as follows:

Regulating Services: countries with larger forest areas, such as Germany and Finland, generally have larger PES case studies area for regulating services. For instance, Germany's case studies area reaches up to 298,000 ha, reflecting the extensive management needed for services like water regulation and purification. The UK also has a notable case studies area of 640,000 ha, despite its smaller forest area (31,986.7 ha), indicating a high priority for regulating services (Figure 23).

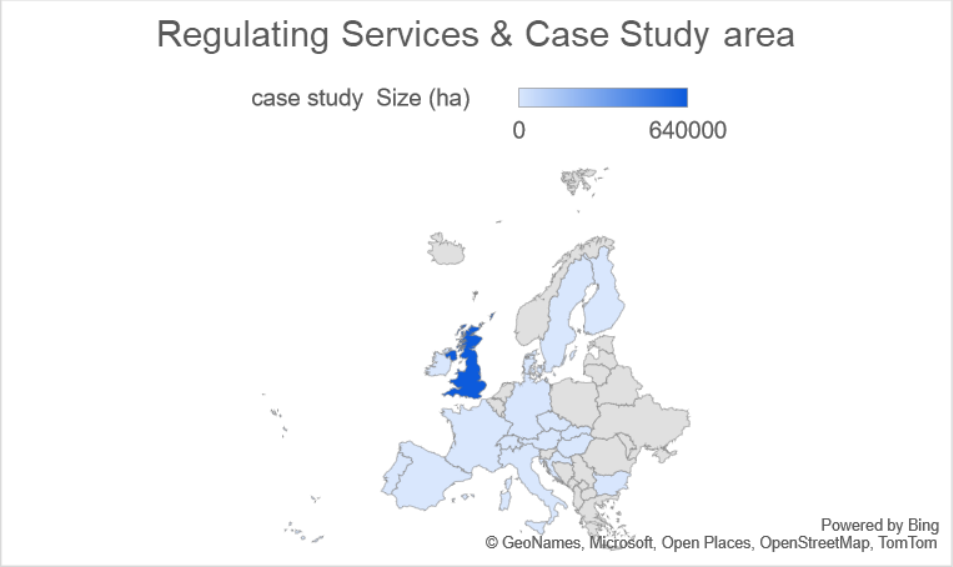


Figure 23: Total sum of the area of the studied PES case studies in each country focusing on regulating services in Europe [n= 29]

Provisioning services: Based on our selection of case studies, Germany stands out with a total PES case studies area of up to 800,000 ha, highlighting its focus on managing ecosystem goods and services such as timber and watersheds. Portugal also has a notable PES case studies area of in average 16,000 ha, and France follows with 3,800 ha. Austria has a smaller PES case studies area of 123.98 ha, and Belgium has a minimal case studies area of 2.90 ha. The United Kingdom's PES case studies area is 1,140 ha. The rest of the countries do not have any data available regarding PES case studies areas for provisioning services. This pattern suggests that countries with substantial forest areas or strong resource management strategies tend to allocate larger areas for provisioning services. (Figure 24).

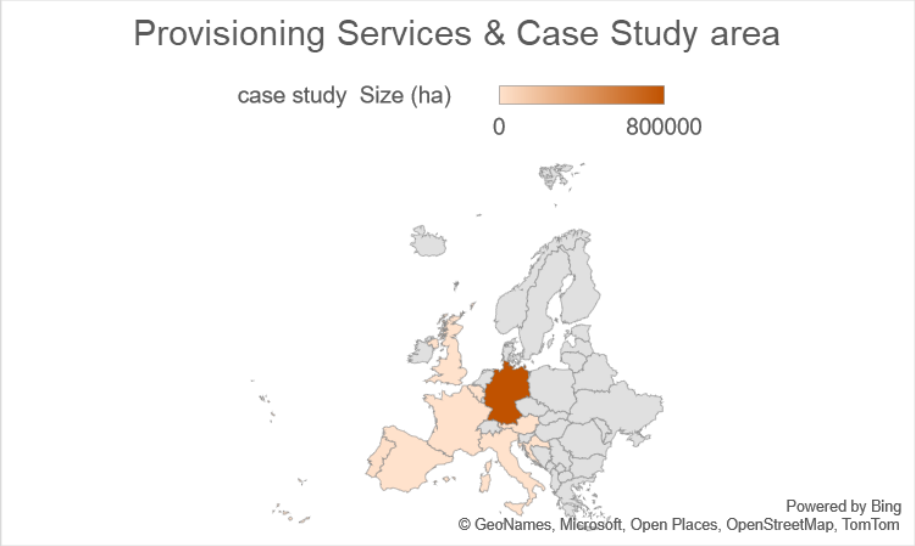


Figure 24: Total sum of the area of the studied PES case studies in each country focusing on provisioning services in Europe

Cultural Services: the analysed PES case studies for cultural services are generally smaller in area compared to those for regulating and provisioning services. Among the countries with available data, Romania has the largest case studies area at 45,000 ha, followed by Italy with a case study area of 10,000 ha and another smaller case study of 11 ha. Finland also has a significant case studies area of 1,000 ha. The rest of the countries do not have any data available regarding case studies areas for cultural services. This suggests that cultural services may often be managed at local level, reflecting their specific and context-dependent nature when it comes to scenic beauty or infrastructure, particularly in countries where smaller case studies are noted (Figure 25).

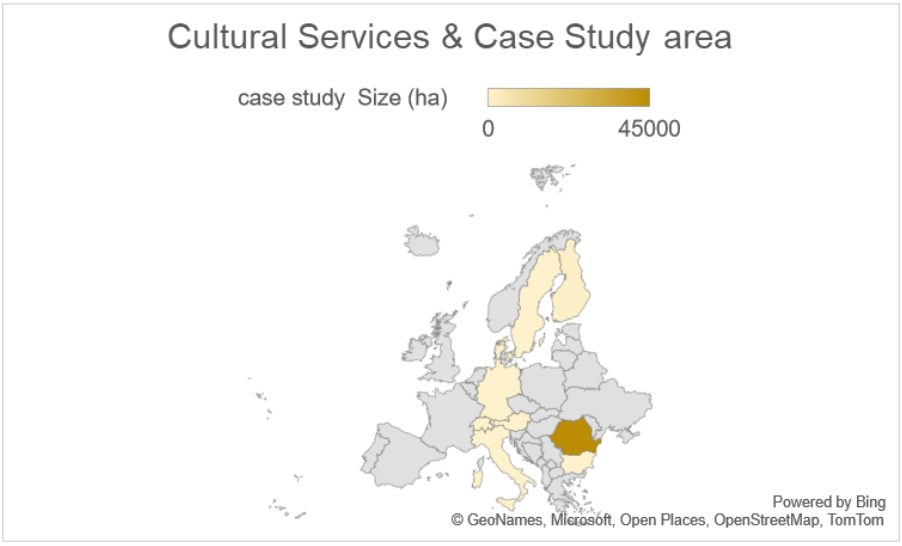


Figure 25: Total sum of the area of the studied PES case studies in each country focusing on cultural services in Europe

Supporting services, which underpin other ecosystem services, also show varied case studies areas but appear much less compared to the other ecosystem service categories. Among the few identified case studies, Germany invests into comparatively larger case studies to maintain essential ecological function with a 750-ha area of the case studies while Italy has a smaller case studies area of 41.3 ha. No data is available for all other countries (Figure 26).

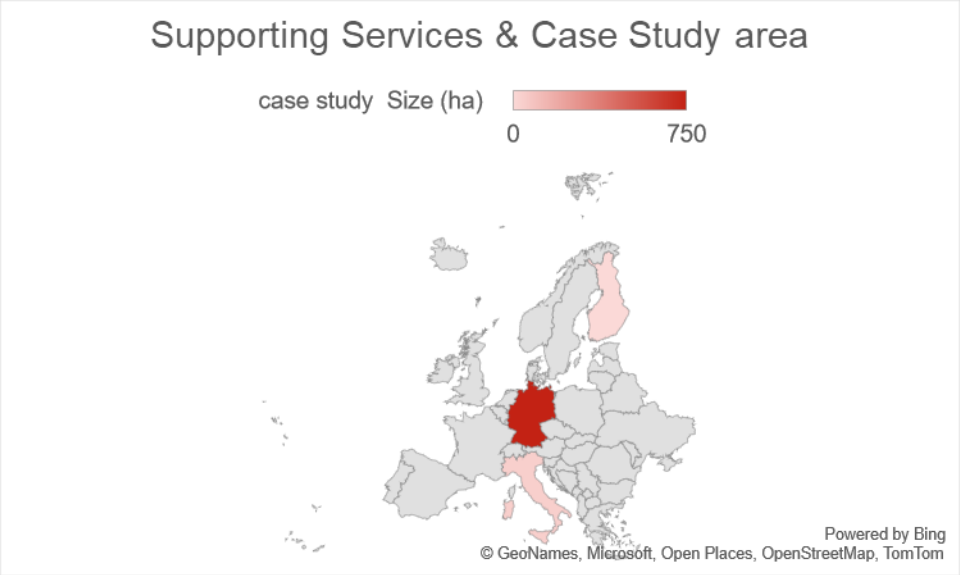


Figure 26: Figure 26: Total sum of the area of the studied PES case studies in each country focusing on supporting services in Europe

Overall, the data demonstrates that larger forest areas are generally associated with larger PES case studies for regulating and provisioning services. In contrast, cultural services often involve smaller, localised case studies, and supporting services show just a very limited number of case studies with a range of areas depending on the country's focus on ecological processes. The pattern underscores the varying approaches to the studied PES management across different ecosystem services, influenced by the forest area and specific national priorities. However, it is important to recognize that smaller PES case studies are still significant. Their impact is substantial but scaled to match the area and capacity of the area each case study manages.

Figure 27 explores the relationship between the share of the forest cover in a country and the average area of PES case studies (in hectare) in these countries (50 case studies, 20 countries). The data do not reveal any significant relationship between the amount of forest cover in a country and the average PES case study area in the country.

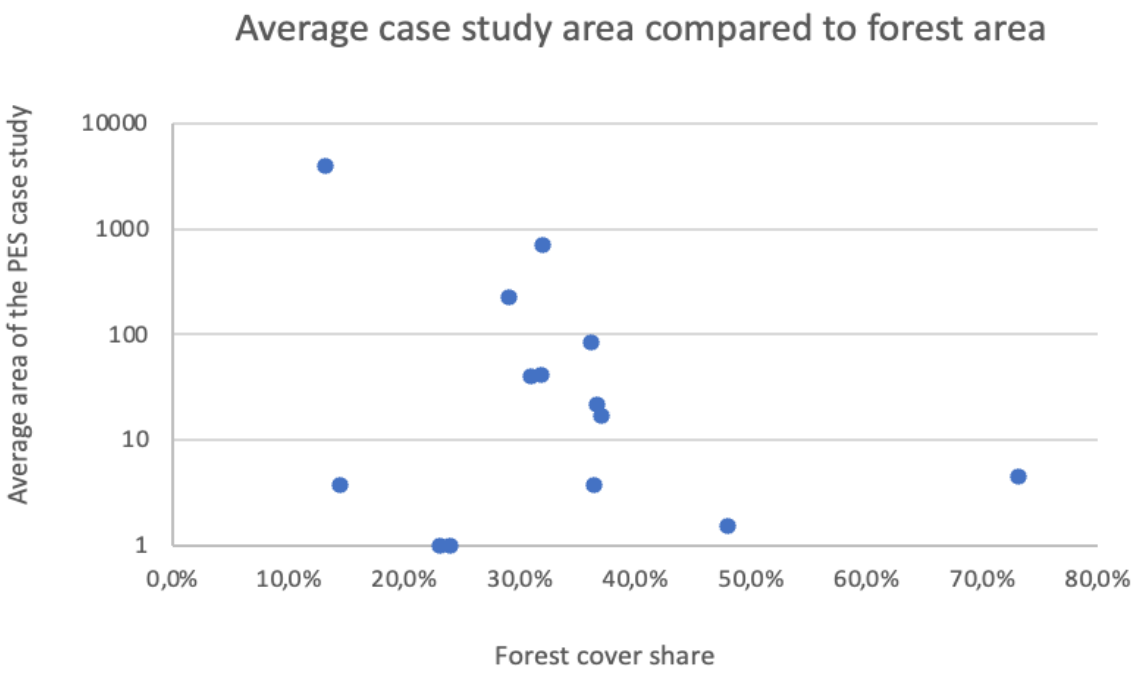


Figure 27: Relationship Between Forest Cover Share and Average PES Case studies area (Hectares) by Country [n=50]

4.2. Insights on in-depth case studies

4.2.1 Responses to the survey

A total of 9 experts from diverse PES case studies across Europe took part in our online questionnaire (Appendix 8.1). We asked their insights and perceptions on various aspects of PES funding arrangements within the EU financial framework, as well as on capital assets based on their experiences with their respective PES projects. The responses were collected using Likert scale followed by open-ended questions for further elaboration of each answer. The results are displayed in the following subchapters with stacked charts illustrating the distribution of agreement and disagreement levels.

a) ***Capital asset of the studied PES outcomes***

When it comes to the role of PES in improving local community access to essential services, there is generally a lot of conditionality and/or unclarity, which can be seen from the number of neutral answers from the respondents (Figure 28). For services like clean water and education, more than 45% of the respondents agree that their PES projects contributed to outcomes associated with these categories, and some portion of this percentage even answered with 'strongly agree' pointed by the darker green color on the bar. The rest of the bars are of neutral answers. This indicate that these two sectors are likely the ones that benefited most from the implementation of the studied PES schemes. This is relevant with the fact that most of the study cases (and European PES projects in general) include water protection/regulation among their project objectives. This finding also demonstrate that capacity development in the form of education is a widespread practice among the projects while also being the main objective of some case studies e.g. Love the Forest Project in Sweden.

> "*…and there is a lot of effort to educate forest owners (that we do)*." (respondent 3)

When it comes to access to social services, there is also a noticeable positive impact perceived, even though a larger proportion of respondents answered neutral. This suggests that while PES schemes may have had a beneficial effect, they may not be as pronounced or universally recognized in these sectors. One of the respondents also mentioned about the difficulties in measuring the significance of PES social impact of PES due to the already high living quality in Europe:

"Social impacts of the PES are not measured. (Here) living standards are already high, it is difficult to define if an additional income for forest managers may result in improved living conditions." (respondent 7).

The perceptions regarding access to food, shelters and healthcare are more mixed although generally indicating conditionality and/or unclarity with neutral answer domination. This reflects a more varied experience, where some communities may not have seen as much improvement/benefit in these areas as a result of PES initiatives and some other projects experiencing more significant improvement/benefit than others. This might also be relevant with what was being pointed out by the quotation above.

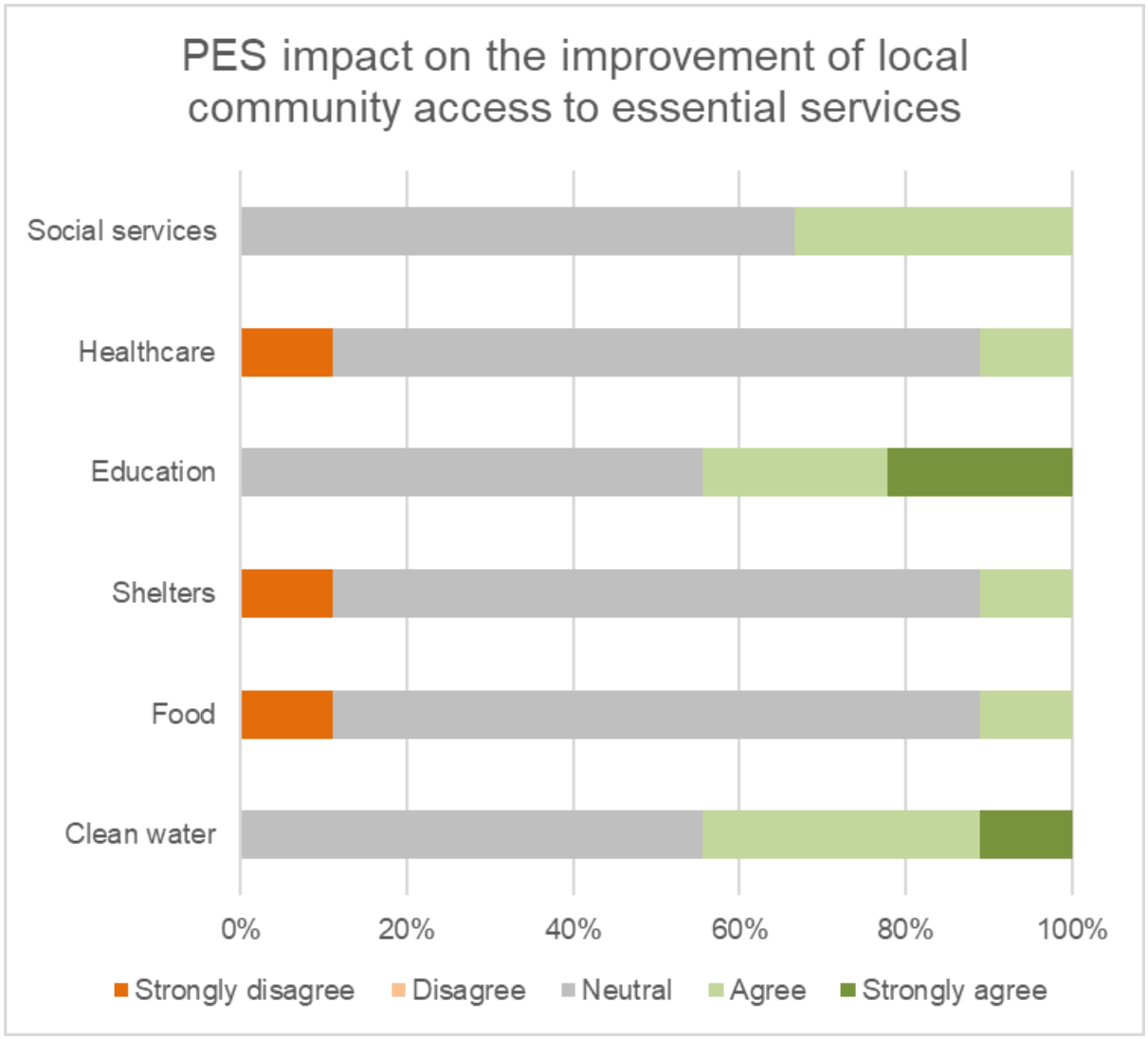


Figure 28: Expert perceptions on the PESs role in improving local community access to essential services [n=9]

While the respondent's perception of the studied PES impacts on the improvement of access to essential services were generally indicating conditionality and/or unclarity with neutral answer domination, the impacts on employment opportunity are more evident (Figure 29). This implies that PES initiatives were more directly linked to job creation, providing individuals with opportunities in sectors closely related to ecosystem management and conservation. The questionnaire specifically divided the perceived impacts across three different sectors.

In the Natural Resource Management sector, the perception of the studied PES's impact on employment is largely positive. A significant majority of respondents (approximately 80%) agree that PES contributes positively to job creation in this area. Additionally, around 25% strongly agree with this sentiment, indicating widespread accordance for the role of PES in enhancing employment opportunities within natural resource management. There was only one disagreement answer, which was due to the particular challenge faced by the project, in which its area size is not big enough to produce such impact.

The responses in the eco-tourism sector are more varied. Although a substantial portion of respondents (45%) agree that PES have a positive impact on employment in eco-tourism, there is also a noticeable level of neutrality (around 20%) and disagreement (around 30%). This was due to the fact that not all PES projects necessarily involve ecotourism in their objectives.

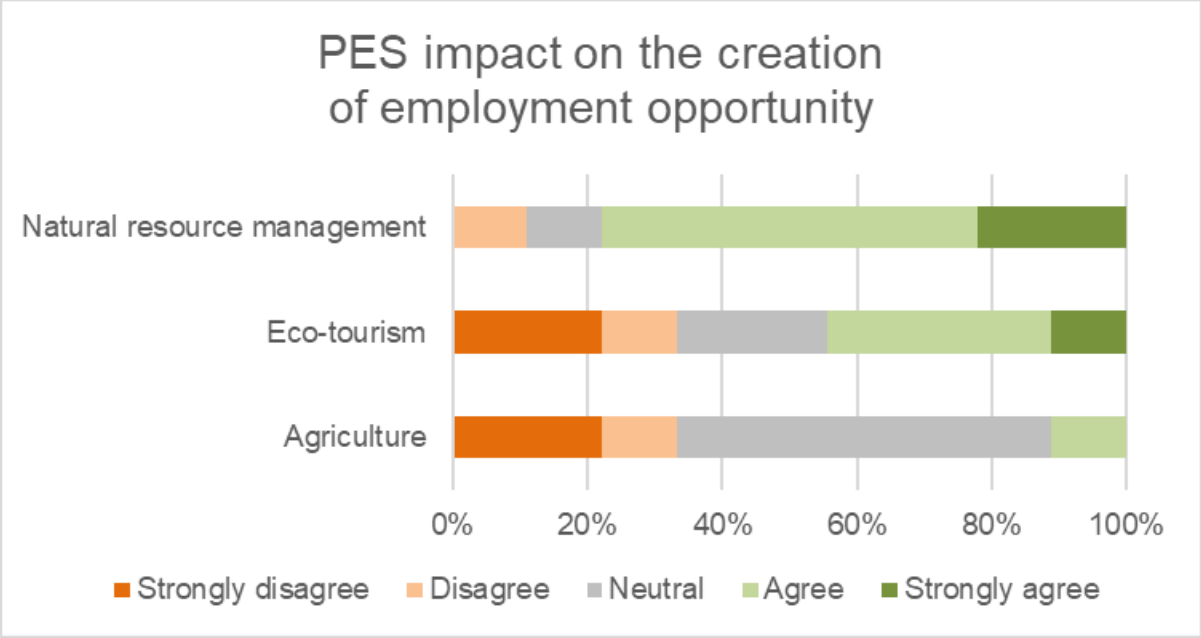


Figure 29: Expert perceptions on impacts on employment opportunities in the PESs projects [n=9]

In the Agriculture sector, perceptions of the studied PES's impact on employment are notably more pessimistic. Only around 15% of respondents agree that PES enhances employment opportunities in agriculture, while a majority (over 60%) remains neutral, indicating conditionality and/or unclarity. The level of disagreement is similar to the eco-tourism sector (30%), with a little more than 20% even strongly disagreeing. This distribution suggests a more contentious view of PES's effectiveness in fostering job creation within agriculture. The more mixed and pessimistic answers for both the agriculture and eco-tourism sector also indicate the context-specific nature of PES project's effectiveness, which may depend on the particular dynamics and conditions of each sector and/or the project itself.

The respondent's perceptions on the PESs impact on the local economy can be observed in Figure 30. A little over 55% of our respondents view the studied PES favourably in terms of increasing alternative income opportunities. A substantial portion of them expressed strongly agree (around 22%). This suggests that PES is generally seen as effective in providing alternative sources of income, which is crucial for communities that rely on diverse economic activities. The neutral responses are also significant, indicating that while many recognize the benefits, it may not be in the form of direct impact or maybe it is conditional or the long-term effectiveness is not clear yet.

In terms of the impact to increase material wealth, the responses are more dominated by neutrality with over 55% of the responses, followed by disagreements with over 30%. This suggests that for some, PES has not translated effectively into increased material wealth. This may reflect challenges in translating ecosystem services into tangible economic benefits for all community members. In the context of increasing households' income, there is less dominance of neutral answers (45%). Disagreement came in second (over 45%) which 20% of it is of strong disagreement. Agreeing answers only account for a little over 10% of the response. This indicates a weak tendency of PES to contribute to increasing household income (Figure 30).

For increasing community income, the responses are notably positive, with almost half of the respondents agreeing (35%) and strongly agreeing (10%). This indicates a favourable view of PES ability to uplift community-wide income levels, suggesting that PES initiatives might be more successful at a collective level rather than at individual or household levels. The neutral

responses (around 45%) still show that some respondents are uncertain about these benefits, in which one of the possible reasons is the uneven distribution or recognition of income gains within the community. In the case of PES impact on the creation of job opportunities, 35% of the respondents expressed agreements, while the domination is by neutral answer (over 45%). This indicates that while the creation of new jobs is a recognized benefit of PES, it may not be as widespread or evenly experienced across all respondents.

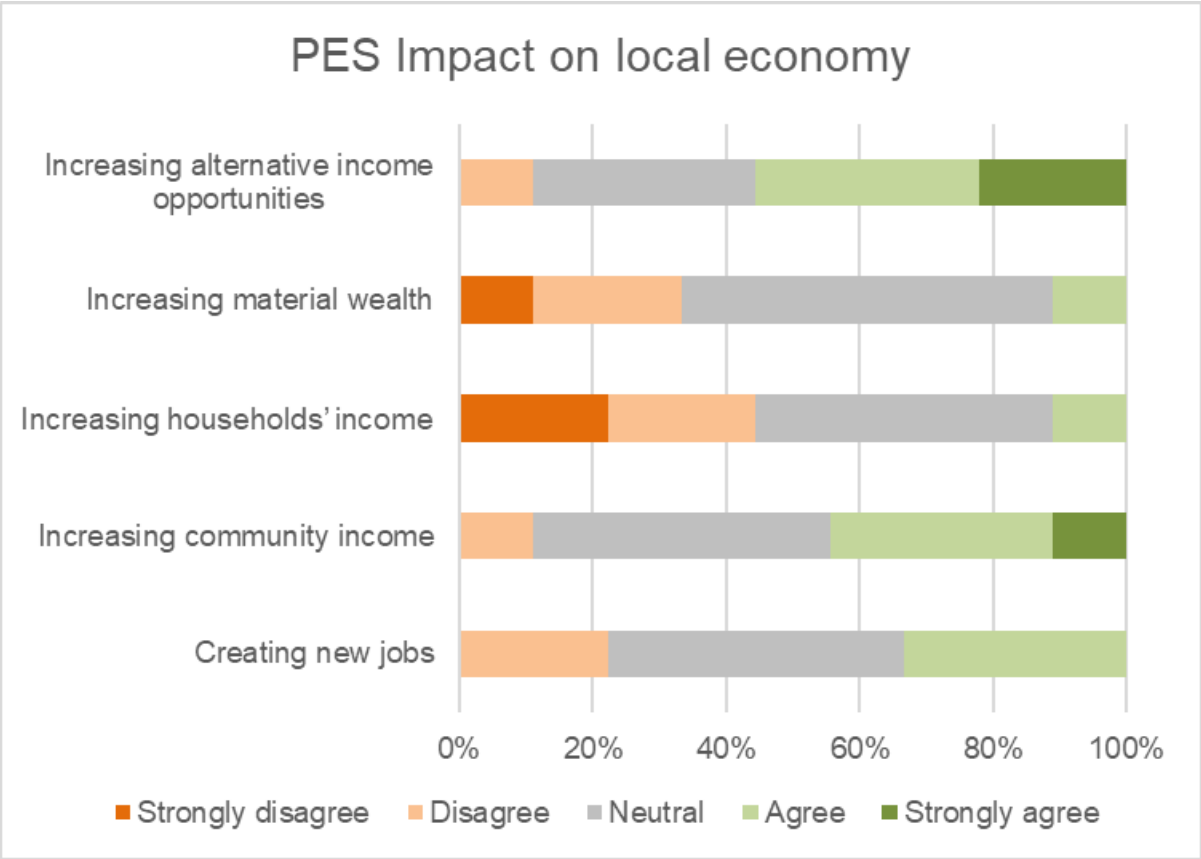


Figure 30 : Expert Perceptions on the PESs impact on the local economy [n=9]

The graph on Figure 31 illustrates perceptions of the effectiveness of other aspects than the ones previously discussed, focusing on governance, community involvement, and the equitable distribution of benefits. In regards to local NGOs' involvement in decision-making and implementation, the results show that a significant majority of respondents answered neutral (almost 60%) suggesting that the majority may either not be fully aware of NGO involvement or see it as less important. However, there is also a noticeable agreement stance (around 30%), indicating a portion of the respondents that recognize the contribution of NGOs. For whether a locally managed administration works efficiently, the responses are heavily positive with 45% strongly agree and 30% agree answers. This can be an evidence that

local administrations have handled funds and contracts efficiently, promoting transparency and accountability. This also suggests a high level of trust in local governance structures within the context of PES projects. Nevertheless, the remaining percentage composed of neutral and disagreement answers in equal manner indicating that there may still be room for improvement or that some respondents are unsure about these practices.

The statement on adherence to legal and regulatory measures is heavily favoured as well, with a significant proportion of respondents strongly agreeing (45%) or agreeing (25%) that PES projects have effectively complied with environmental laws, community rights, and sustainability goals. This indicates confidence in the legal and regulatory frameworks governing PES projects. However, the neutral response rate (around 30%) suggests that some respondents might not have enough information to fully assess this aspect. Regarding participatory decision-making processes, the answers are dominated by the green bar of agreement (45%) and strong agreement (around 20%), which indicates that PES case studies have promoted inclusive decision-making involving local communities. This positive response underscores the perceived success of PES in engaging communities in project design, implementation, and monitoring. However, the neutral response (around 35%) suggests that some respondents may feel that participation could be further enhanced.

In terms of PES support to capacity-building programs, the responses reflect broad agreement, with about 55% agreeing and around 20% strongly agreeing that PES has supported programs empowering local communities. These suggests that the projects are seen as enhancing the ability of communities to engage in projects and access broader social services, highlighting PES's role in fostering community development. The remaining percentage of neutral responses, however, suggest that the impact of these programs might vary, or that more could be done to make these efforts universally effective.

The assessment of the studied PES's role in fostering the long-term viability and resilience of communities is also very positive, with around 55% agreeing and 20% strongly agreeing. This suggests that many believe PES contributes effectively to the sustainability of community livelihoods. Regarding the equitable distribution of ES benefits, the response is somewhat 50:50 for neutrality and agreement, which suggest there are considerable cases where ES

benefits are distributed equitably among different social groups while there may be equally emerging concerns or uncertainties about equity in benefit sharing.

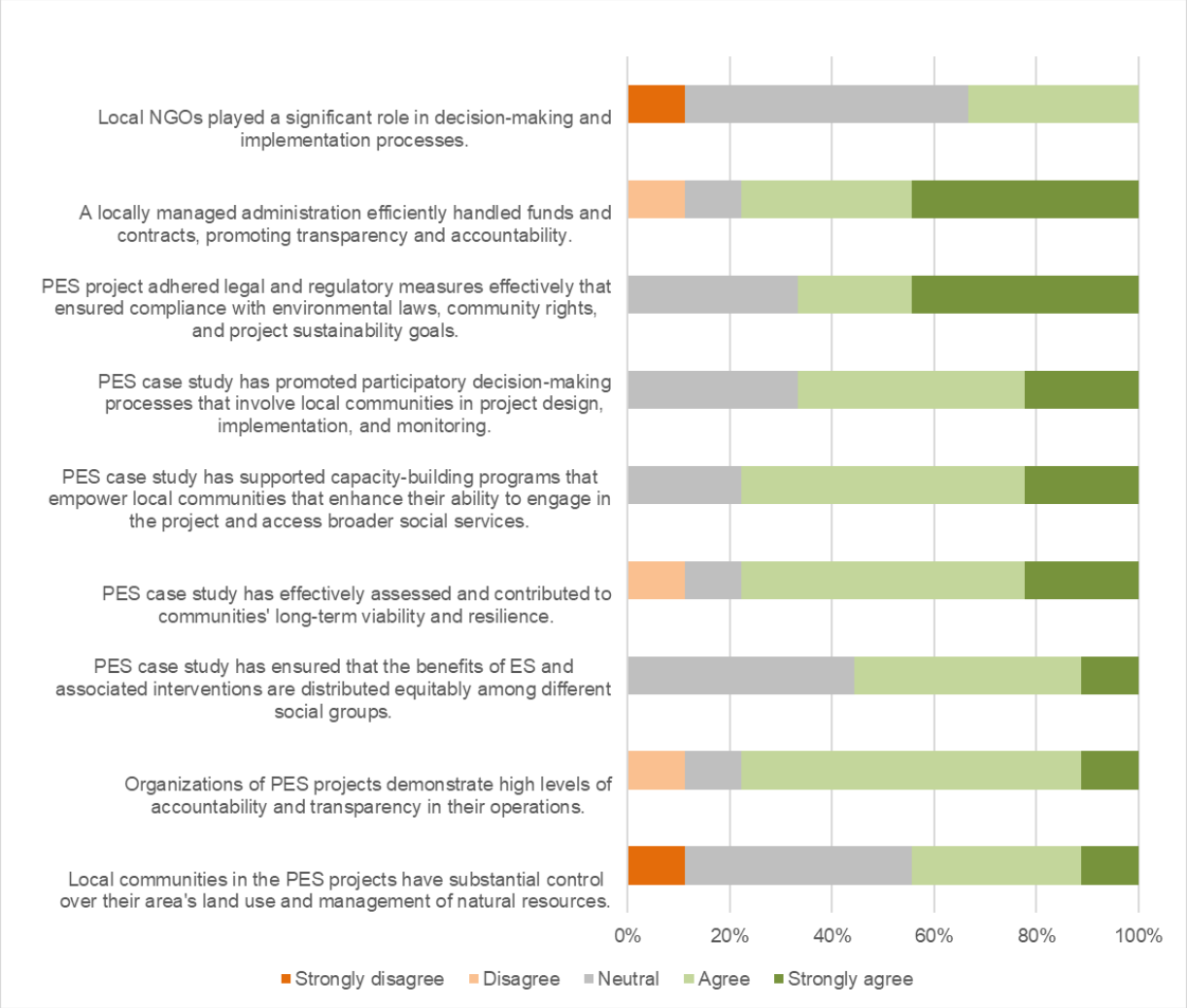


Figure 31: Expert perceptions on the effectiveness of Governance, Community Involvement, and Benefit Distribution in analyzed PES case studies [n=9]

The perception of accountability and transparency in PES organisations is generally favourable, with over 65% agreeing and 10% strongly agreeing that organisations demonstrate high levels of these qualities. The significant positive response suggests confidence in the integrity of these organisations, though the remaining percentage of neutral and disagreement responses indicate that transparency might not be uniformly evident to all participants. As for the perception of local community control on land use and natural resource management, the responses are more diverse but still dominated by the green bar with around 35% agreement and 10% strong agreement answer. There is also a notable percentage of strong disagreement (10%) and neutral answer (45%) which suggests that while

many see communities as empowered, there is a significant portion of respondents who feel that local control could be strengthened or who perceive existing control as insufficient.

b) *Financial and funding arrangements´ factors*

Figure 32 provides graphic representation of experts' perceptions regarding the financial arrangements in PES projects. It highlights a range of opinions on various aspects of project funding. The first aspect evaluated is whether financial and funding challenges faced by the analyzed PES case are effectively addressed. Most respondents (45%) disagreed with the statement, 35% and the other 20% strongly agreed. This indicates that although there is a significant number of stakeholders concerned about the effectiveness of these efforts, there is a notable percentage who accomplished or might have the potential to accomplish effective handling of funding challenges.

Regarding the established laws and regulations ensuring the long-term financial sustainability of the analyzed PES cases, 35% of the respondents expressed agreement with the statement, of which around 20% of them strongly agree. However, 35% of the respondents responded with disagreement and 30% with neutral answers, suggesting that not all stakeholders are convinced that the current legal frameworks are sufficient for ensuring sustainability.

When asked about the sustainability of current funding arrangements over the long term (more than 10 years), over 55% of the respondents believe that these arrangements are sustainable, and the rest disagrees (where over 15% of them expressed strong disagreement). This suggests varying experiences regarding the long-term viability of funding strategies, indicating a potential area for further development or reassessment.

The use of innovative financial instruments or approaches within the projects is largely perceived positively with 70% of respondents agreeing or strongly agreeing. However, a notable portion of 30% respondents who disagree or answered neutral suggest that innovation in financial approaches may not be consistently perceived or applied across different projects.

In terms of financial mechanisms supporting efficient management and disbursal of funds, the responses are mostly positive, with 55% of the stakeholders agreeing or strongly agreeing. A little over 30% of respondents expressed disagreement, indicating that a notable portion

still feel that the current funding options are either too limited or not adequately suited to the diverse needs of the projects.

As for the statement on diversification of funding sources, 45% of the respondents agree that the funding sources are well-diversified, 30% neutral and the remaining 40% disagree. This reflects some concerns that projects may be overly reliant on limited funding sources, potentially compromising financial stability.

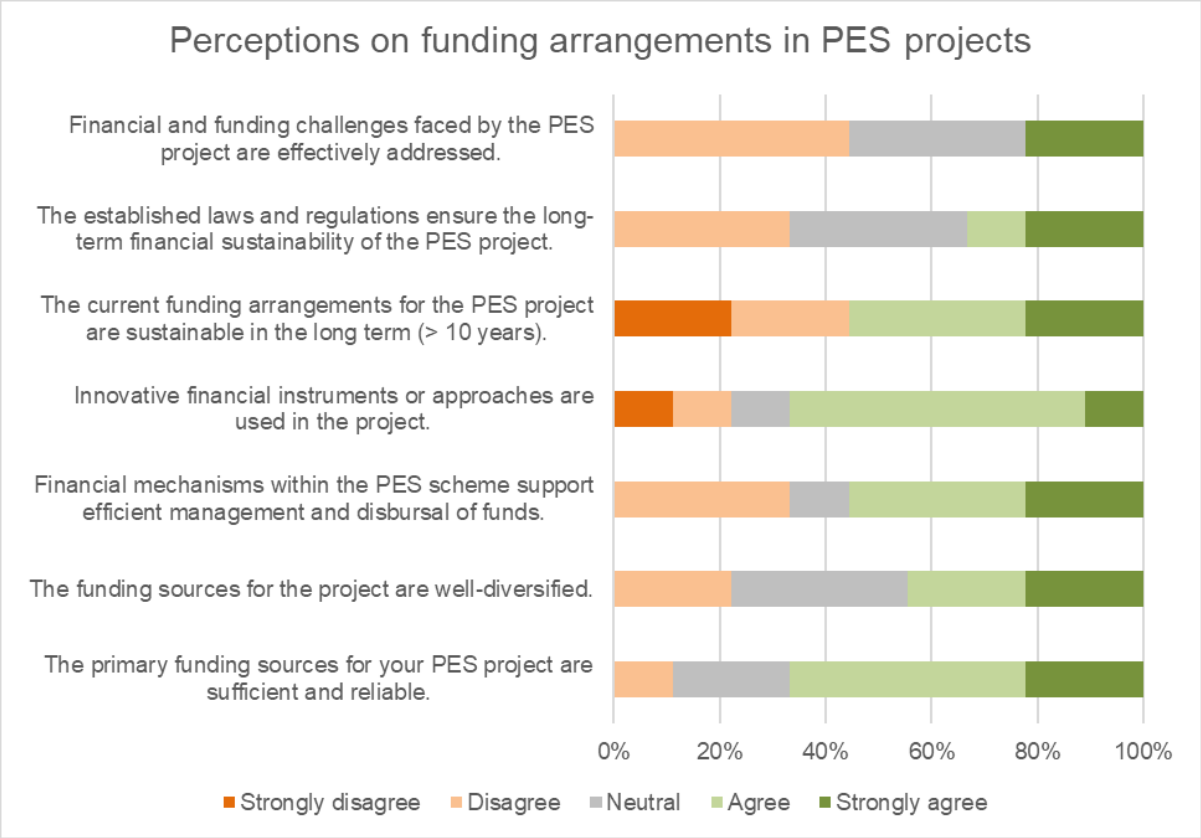


Figure 32: Expert perceptions on financial arrangements in the studied PESs projects [n=9]

The respondents' perceptions of the sufficiency and reliability of primary funding sources for the analyzed PES cases are notably mixed. Most of the respondents (almost 70%) expressed agreement, while 25% neutral and the rest disagreed. This highlighted that although a significant number of projects are generally satisfied with their funding sources, there are notable amounts who were not. This depends on the specific circumstances of their projects.

c) *EU financial program & state financial frameworks*

A significant majority of respondents consider both policy support and financial assistance from the EU as crucial for the success and sustainability of the studied PES schemes they

are/were involved in (Figure 33). For the question on how critical policy support and governance mechanisms are to accessing EU financial and state aid frameworks, nearly 90% of the respondents rated it as "important," "very important," or "essential" and the rest believed that it is important but only to a limited extent or degree. This indicates a strong consensus on the necessity of robust policy frameworks and governance to facilitate access to vital financial resources. Similarly, the importance of financial support from the EU government was majorly acknowledged, with around 75% of the respondents considering it as “somewhat important” to “essential” for the sustainability of the studied PES schemes they are or were involved in. This highlights the needs for financial backing for the analyzed PES cases, reflecting that without adequate funding, the long-term viability of these projects might be at risk.

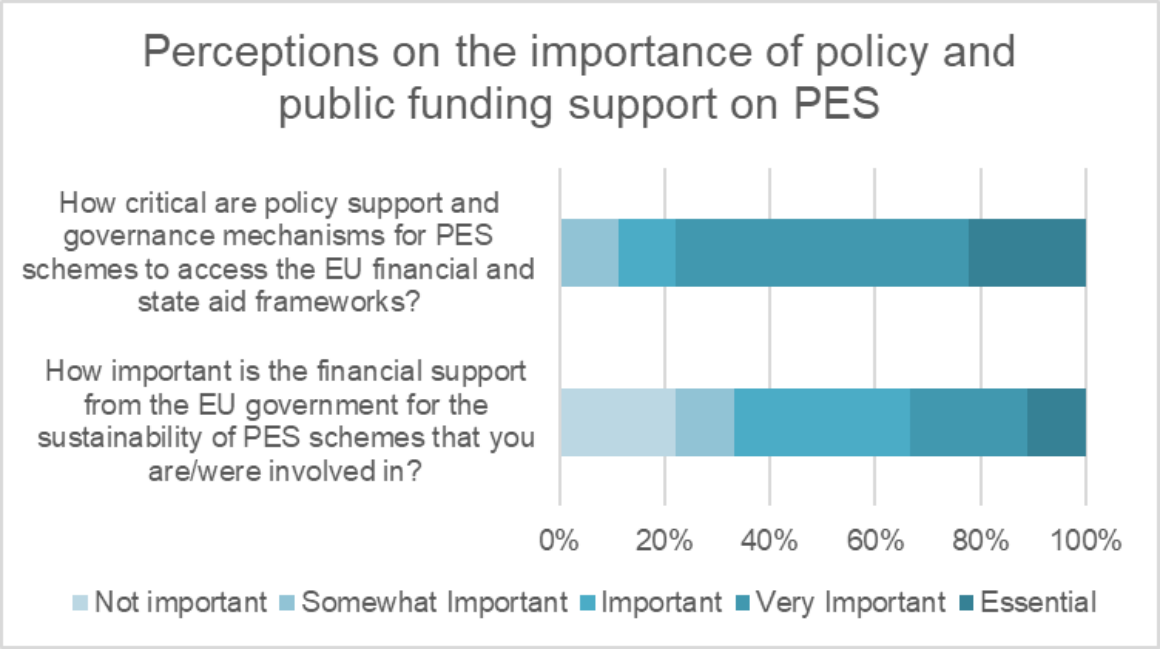


Figure 33: Expert Perceptions on Importance of EU Policy Support and Financial Assistance for the Success and Sustainability of the studied PESs Schemes [n=9]

When we asked about respondents' views on whether the current support from policymakers and stakeholders is adequate, the majority (90%) of respondents answered neutral (Figure 34). The remaining 10% agree with the statement but only to some extent. This ambivalence suggests that generally, while some support exists, it is neither sufficient nor inadequate, indicating potential areas for improvement in how policymakers and stakeholders engage with and support the analyzed PES cases.

We also got a majority of neutral answers when we asked the respondents about existing gaps and challenges within the EU financial and state aid frameworks. However, 35% of the respondents agree that there are gaps that hinder the promotion of the studied PES schemes. This consensus points out the need for adjustments within the frameworks to better facilitate and promote the studied PES initiatives, addressing the existing barriers. One of the respondents stressed the importance of having more discussion about financial tools:

> "*The implementation of PES tools needs much more discussion about compensation tools and their future potential*." (Respondent 2).

Another respondent also seconded the above-mentioned opinion and pointed out that ensuring accessibility to the funding sources is as essential as providing it:

> "*I tried to access the money (funding source), but the local contacts were not able to tell me what I should provide as a document, and where I should send it. Also, the local municipalities (that) I work with told me (that) they do not want to spend time asking for State or Europe money because it is too much administration, they prefer to cancel or renounce some (other) projects*." (respondent 5).

When addressing the success of overall support provided by the current EU financial and state aid frameworks for the promotion of PES schemes, many respondents gave neutral sentiment (almost 80%) and the rest disagreed. This dissatisfaction, even though only a minority expression, underscores the perceived shortcomings of the current financial frameworks, suggesting that further refinement is necessary to enhance the effectiveness and sustainability of PES schemes. Additionally, respondents who disagreed were showing awareness of some public funding opportunities, yet their projects did not necessarily utilise them, indicating potential barriers in accessing these funding resources.

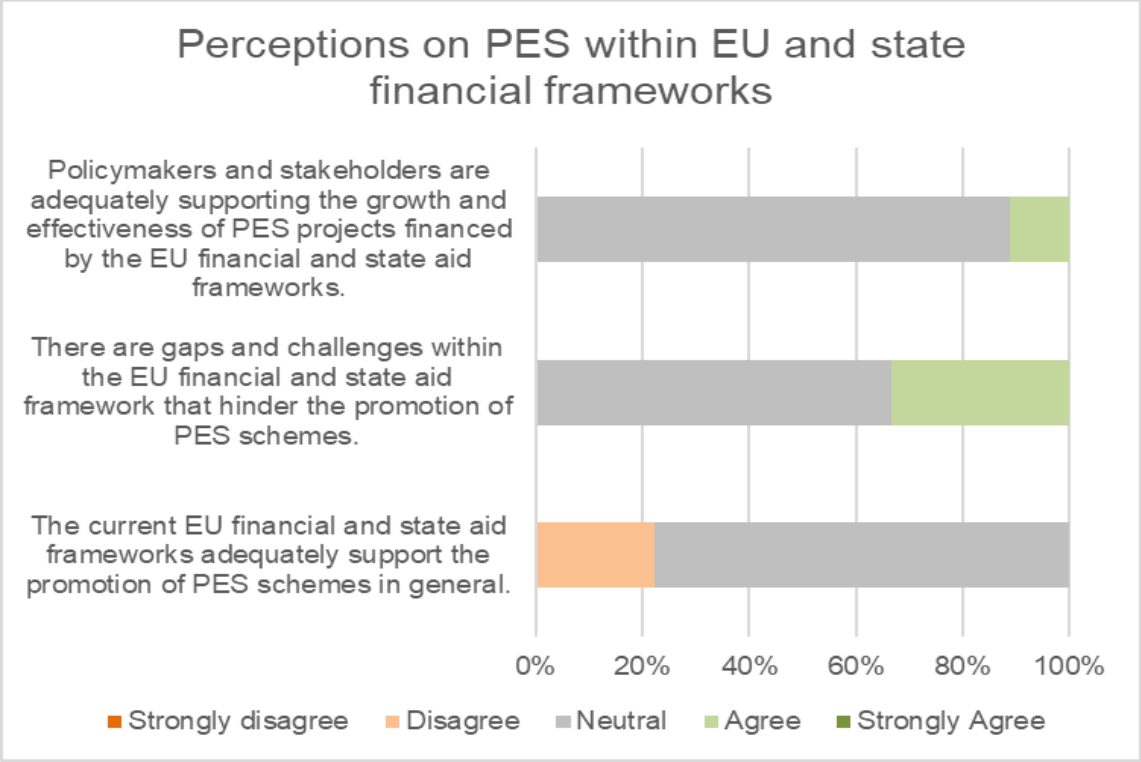


Figure 34: Expert perceptions on the studied PESs within EU and state financial frameworks [n=9]

4.2.2 Interpretation of the responses to the survey and the interview

In the following sections, the key opportunities and barriers identified through the qualitative content analysis of in-depth case studies. For opportunities, we identified six main categories: capacity building, communications, financial guarantees, implementation, legal framework, and inclusive participation. Regarding Barriers, seven categories emerged: bureaucracy, communication challenges, conflicts of interest, financial constraints, implementation difficulties, participation issues, and scale/time constraints.

a) Identified opportunities

Table 7: Interview response opportunities (Atlas coding summary)

	R1	R2	R3	R4	R5	R6	R7	R8	R9	Totals
Capacity building		●	●		●				●	4
Communications	●				●				●	3
Financial guarantees	●		●	●	●				●	5
Project implementation	●	●	●	●	●		●		●	7
Legal framework				●	●		●		●	4
Inclusive participations	●	●	●	●	●		●		●	7

Project implementation is the most frequently cited theme when it comes to opportunities, where it presents in seven of the nine case studies (Table 7). No opportunities were identified from the responses of respondents 6 and 8, as they provided limited information in the open-ended sections of the questionnaire. This was likely due to the voluntary nature of those questions. One respondent raised a thought-provoking point about 'green advertising' being one of the purposes behind PES project initiation:

> *"It's just that all the service for the climate forest was done by the forest agency. And it was not paid until the forest agency started the project just to show, 'okay, we are climate activists as well and do not just grow woods'." (Respondent 2)*

In the last 40 years, green advertising has developed into an essential component of marketing strategies in many parts of the world (Jussila 2019). While this approach in some instances could serve as a catalyst for initiating a PES project as what demonstrated by the quotation above, it also risks encouraging greenwashing, when not handled correctly, where entities or individuals would make misleading or exaggerated claims about their environmental efforts, as what has been observed by various studies (Kwon *et al.* 2024, Jussila 2019, Segev *et al.* 2016). Therefore, a cautious approach is essential, involving careful planning and deeper exploration to understand the potential consequences. Several countries have implemented regulations to minimize misleading green advertising claims in commercial practices, for example the EU who launched the Unfair Commercial Practices Directive and its accompanying Guidance Document (Nemes *et al.* 2022). It is also important to note that genuine intentions and ethical considerations must take priority in PES projects as they are meant to deliver real, long-term environmental benefits. This statement is also supported by a follow-up statement by the same respondent clarifying that this approach might not be the most sustainable way to run a PES project, as such motivation tends to be short-lived.

Several respondents pointed out that although climate change may present obstacles to project success, it could also reveal new opportunities for mainstreaming PES into climate risk management policies and strategies. As climate change threatens the sustainability of natural ecosystems, PES is increasingly viewed as a viable strategy to address these climatic challenges.

"Climate change issues and adaptive management necessity may contribute to additional PES schemes. (…) Biodiversity and other ecosystem services will gain importance in the future providing additional opportunities to PES schemes" (Respondent 4)

The theme of inclusive participation, evident in seven of the cases, highlights that this aspect is well addressed in most instances. Actively engaging a diverse range of stakeholders—such as local communities, landowners, and governments—is considered crucial, especially given the requirements from certification processes that some cases must meet:

"(…) certification procedures imply public participation of involved stakeholders" (Respondent 4)

"The local community lead the project, and (we) describe it in the certification grid to give it certified value for local enterprises to contribute." (Respondent 5)

"The certification requires a basic stakeholder consultation, which is conducted through events, but without a real participatory decision-making process." (Respondent 7)

The findings also suggest that raising public awareness and willingness to pay for ecosystem services can greatly benefit PES projects. Effective education and communication about the benefits of PES programs are crucial. Respondents 1 and 2 even emphasized that tailoring communications to local conditions can encourage greater stakeholder support and investment in these initiatives. By increasing awareness and incorporating inclusive decision-making processes, long-term commitment to sustainable PES projects can be more secured.

Financial guarantees appeared in five of the case studies, indicating the potential for stable funding sources to support PES projects. Respondents identified several key opportunities for strengthening PES projects financially, including international-regional financing partnerships and public-private partnerships. These strategies can help address financial gaps and provide the resources needed for both the initiation and long-term operation of PES projects. Additionally, one respondent emphasised the importance of integrating PES into the EU

financial framework, highlighting its relevance to current barriers and opportunities, such as those in the bioeconomy:

> *"Bioeconomy is on the rise (…). There is a lot of investment from bigger companies to local projects. it all depends now if these funds are used wisely and if the EU will promote regulations that favour sustainable PES projects instead of only carbon credit reforestation projects" (Respondent 3)*

Legal frameworks and capacity building, both themes are identified in four case studies, offer additional areas for growth. A clear and robust legal framework provides structure for PES projects, ensuring that the roles and responsibilities of stakeholders are well-defined. This, in turn, reduces the potential for conflicts and enhances project governance.

> *"The first principle on adhering to certification implies complying with all public laws" (Respondent 4)*

Meanwhile, building the capacity of stakeholders represents an opportunity to equip participants with the necessary knowledge and skills to engage effectively in PES initiatives. It can also pave the way for integrating long-term planning, improving adaptive management and monitoring capabilities.

> *"Within the project a lot of meetings, trainings and media trips were organized. All of them contributed to the awareness raising process regarding the PES idea and how to manage voluntary base PES scheme." (Respondent 9)*

> *“The staff has importantly improved their skills in PSE, and now consider it as an important financing lever that could even replace public subsidies with less administrative constraints, higher financing rate, and better adequation with local concerns.” (Respondent 5)*

Communication opportunities were noted in three cases, in which they present a clear opportunity for enhancing stakeholder collaboration. Effective communication strategies can ensure that all parties have a shared understanding of project goals, methods, and expected outcomes, minimizing the risk of misunderstandings or conflicts. Additionally, new forms of interaction between ecosystem service buyers and sellers, such as social media, can promote

more transparent and efficient interactions to better align expectations between stakeholders:

> *"Promotion in social medias of the good examples will increase the trust and the likeliness people to participate in PES schemes even voluntary" (Respondent 9)*

b) Identified barriers

Table 8: Interview response barriers (Atlas coding summary)

	R1	R2	R3	R4	R5	R6	R7	R8	R9	Totals
Bureaucracy	●	●			●					3
Communications		●	●		●		●			4
Conflict of interest	●	●	●		●					4
Financial constraints	●	●							●	3
Implementation constraints	●	●	●		●		●			5
Participation issues	●	●			●		●		●	5
Scale/time constraints		●	●						●	3

We identified seven themes of barriers, namely, bureaucracy, communication issues, conflicts of interest, financial constraints, implementation constraints, participation issues, and scale/time constraints (Table 8). Similar to the previous section, No opportunities were identified from the responses of respondents 6 and 8, as they provided limited information in the open-ended sections of the questionnaire due to the voluntary nature of those questions. Implementation constraints and participation issues were the most frequently cited barriers, appearing in five cases. This includes the adoption of new technology and digitalization to support project implementation. Local managers often struggle with integrating these technologies due to a lack of familiarity, technical expertise, or resources, in which in some cases are exacerbated by the older age of many managers who may be less familiar or resistant to new technologies:

> *"Digitalization and technology help with efficiency a lot, but landowners are all old and are not digitalized yet. Their children don't care too much about the land as they moved into the city. So, there is still a lot of on-site (offline) work needed"* (Respondent 3)

These barriers suggest the need for targeted capacity-building efforts, such as training programs and access to technical support, to ensure local managers are equipped to leverage digital solutions effectively. Addressing this issue might help to enhance project outcomes and improve long-term sustainability. Other implementation barriers were also observed, such as, the participation of partners who had fulfilled their individual goals and become disinterested in continued collaboration. This disengagement tends to hinder the long-term success of PES projects as it creates gaps in both funding and overall operation of the project. A respondent hinted at a measure to cope with this challenge, which is continuous adaptation and readjustment of goals and scope of responsibility for each partner which could possibly help to encourage long-term commitment from partners, to further ensure that their involvement goes beyond short-term goals and aligns with the broader vision of the project.

> *"In the beginning, the partner did the marketing, and they spent money and capacities for that. But, after having reached a certain level of payments, it (the collaboration) didn't grow any further. The partner said, 'Okay, why should I spend my money on that? I'm not a part of the result'. So, this group of partners who pushed the project in the beginning did not have the same ideas after the first five, six years. It spread apart a little bit and they need a new discussion about who is responsible for what."* (Respondent 2)

Participation issues, which are also the most prevalent in all of the study cases, on the other hand, reflect the difficulty in engaging all relevant stakeholders—especially local communities, private landowners, and governments—in a meaningful and sustained way. The reason was varied. As an example, on the case for PES that involves common goods, one respondent mentioned that some potential buyers are not convinced to pay it even though they agree that payment is necessary, but they want the government to do it instead of them because they feel the high taxes that has been posed to them should cover it.

> *"Payment yes, let's do it, but government should do it. I do not pay. That's why you mentioned that people are not willing to pay for that. And they expect the government to pay. … They take a lot of money from us. That's why the government increases taxes. There are so many taxes in our country."* (Respondent 1)

Poor inclusion of local communities in the project was also frequently mentioned in the answers. Several projects might argue that it is not so relevant to include the locals in the particularity of their project, but there were other aspects of the issue being pointed out by the other study cases, in which it is the different understanding or definition of what inclusion means.

> *"…the people who are running the projects are telling us, 'Okay, we do participation'. But the (other) people don't feel that it is participation. Since there is just a meeting, and they are asked some questions, and they can write down their opinion on small cards and pinning them on the board. And then there is a photo of the board, and the participation ends at that point. So, the opinion of the people does not influence the result."* (Respondent 2)

> *"The certification requires a basic stakeholder consultation, which is conducted through events, but without a real participatory decision-making process."* (Respondent 7)

Respondents also pointed out that time restraints, poor resources, lack of capacity and voluntary nature of the PES project may pose some struggle to the effort of improving local inclusion. One of them suggests using a more binding approach between stakeholders.

> *"Because the scheme was voluntary based it didn't last in time. To be sustainable in time it has to be obligatory to participate."* (Respondent 9)

Communication issues and conflicts of interest came second in distribution, each identified in four cases, highlighting the critical role of trust and transparency in PES implementation. Most respondents said that the rather conventional way of communicating without much involvement of digital technology that can help to facilitate it posed some difficulties for them to communicate effectively. While good and clear communication is known to be necessary to avoid misunderstandings that may lead to resistance or lack of stakeholder involvement. It is also relevant to the issue of conflict of interest in some areas. The failure to communicate transparently and find compromise where fits can cause stakeholders perceive unequal distribution of benefits and as a result conflicts of interest will arise.

> *"So, they see that agriculture needs a certain area to feed us and they see that energy needs a certain area to spend enough renewables and they see that biodiversity and water household needs some areas just to be restored again. And so, they feel the interference between the different processes, and they are afraid of having decisions made who are only dependent on the predominant players in the moment."* (Respondent 2)

One respondent quoted below even mentioned the presence of "*a little bit of corruption and 'favours'*". This suggests that there are informal practices that are undermining fair and equitable distribution of resources or benefits. Furthermore, such issues might reflect deeper structural problems going on the scene, such as weak institutional frameworks or inadequate oversight mechanisms.

> *"…there seems to be a little bit of corruption and 'favours' going on and some communities are not happy to share transparently how they use the income from forest products"* (Respondent 3)

Financial constraints were identified in three of the case studies, covering issues like financial guarantees, payment amounts, and transaction costs. These limitations can affect the viability and sustainability of PES projects. One respondent highlighted the high operation costs for not only the maintenance of PES infrastructure but also the monitoring, which is a necessary part.

> *"It (monitoring) costs money for the provider. It's not cheap, it costs a lot"* (Respondent 1)

Similarly, another respondent discussed the financial difficulties caused by inflation, where the cost to employ the conservation measure increased up to 9 times the original cost when they started, which might affect the payment amount they need from the buyers and significantly increasing the price would likely deter potential buyers, complicating long-term financial sustainability. The respondent mentioned that the provider initially tried to cover it with their budget, but as funding dried up, the project's viability became uncertain, raising concerns about the future.

Additionally, respondents also pointed out the barriers of relying on short-term government or EU funding, which is helpful for initiating and operating their project but might not guarantee continuity needed for PES projects to succeed. One respondent recommended that while the government or EU should cover initial investments to commence the project, it is crucial for the project to think about a strategy to be self-sustaining over time.

> *"Just a general recommendation, once the scheme is formed the government/EU should cover the initial investments that would allow the scheme to start working but then it should be self-sustain and to be able to cover its own existing costs"* (Respondent 9)

Another respondent stressed the instability of relying on government fundings due to the rather short-term political cycles, making them less appealing for PES projects to pursue.

> *"The continuity is more secured by this regional water supply than by an EU government which is central and can change in a few years, because politics are changing. And the ES is not interested in politics."* (Respondent 1)

Bureaucracy, noted in three of the case studies, reflect the administrative and regulatory barriers that PES projects face. This is mostly related to their struggle in dealing with government funding, especially EU's. In the previous paragraph, we mention that the short-term nature of these funding made it less appealing, and this is exacerbated by the heavy bureaucracy that these funding schemes often come with, both when applying and spending the fund. Some projects managed to find their own solution to find other funding pools that are easier for them to obtain, but the designated budget from the government to support these projects will be abandoned and will not be spent effectively. Hence, simplifying these processes and offering clear guidelines might reduce these barriers and encourage broader participation. Adjustment to local needs also can be necessary to increase the appeal as expressed by these quotations:

> *"...We know how tricky it is with European money. European funds. …the bureaucracy all the time. The people are shocked by the bureaucracy. …Maybe they should do it easier. They should make it easier without so much bureaucracy. …for example, they (project managers) were totally upset. They didn't want to be again part of the (EU)*

project, because it was so complicated. They think it's also complicated when they receive the funds. We do it on our own. It's easier, they say. Not so much work. A lot of work with a little money, that's no solution." (Respondent 1)

"Also, the local municipalities I work with told me they do not want to spend time asking for State or Europe money because it is too much administration, they prefer to cancel or renounce it to some (other) projects. ...the staff has importantly improved their skills, and now consider it as an important financing lever that could even replace public subsidies with less administrative constraints, higher financing rate, and better adequation with local concerns" (Respondent 5)

Additionally, scale and time constraints limit the capacity of projects to demonstrate measurable results within short timeframes, as ecosystem restoration often requires longer periods to manifest change and results. Another challenge that seemed to be more specific as it was mostly addressed by respondents from projects that consider area coverage as necessary for their project objective, such as the ones that have focused on carbon sequestration or water regulation. It is the issue of area limitations which restrict the scalability or effectiveness of PES initiatives.

"Assessed yes, there is a lot of potential. but we are only at the start of creating an impact." (Respondent 3)

"The scheme was too small and voluntary based. In general, I believe that if the scale was bigger such schemes could generate job opportunities in natural resource management." (Respondent 9)

5 Key insights and conclusions

5.1 Interpretation of the responses to the survey and the interview

Figure 35 highlights the most frequently mentioned word/concept in the questionnaire open-ended answers of the survey and during the interviews. The term ‘forests’, ‘water’ stands out the most on the word cloud, which are two of the key elements in PES schemes. Forests play a vital role in providing essential ecosystem services such as carbon sequestration, water regulation, biodiversity conservation, and soil protection. Water, being one of the oldest and most commonly traded resources in PES schemes, is also prominently mentioned by many respondents. Although it might also be a biased result from the two interviews among nine respondents.

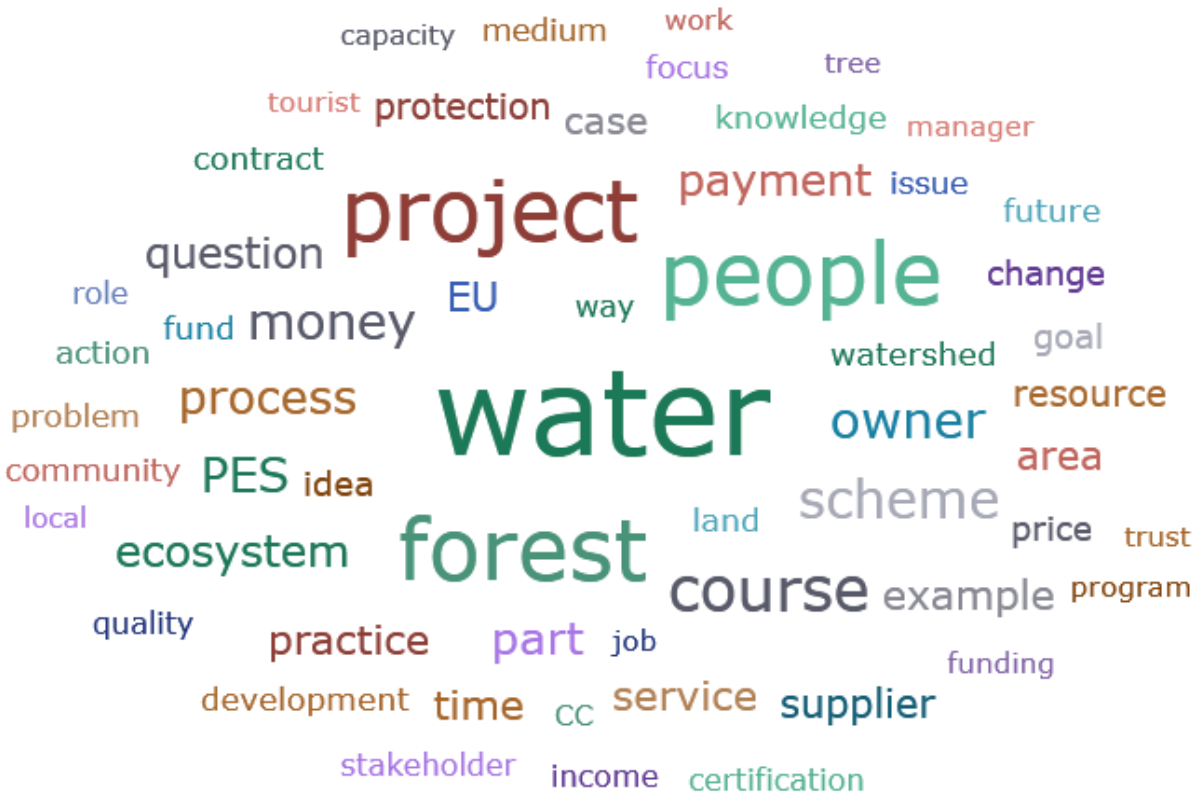


Figure 35: A thematic analysis of barriers and opportunities using interview transcript

Financial constraints, represented by terms such as ‘money’ and ‘funding’, appeared with big enough font on the word cloud as it is frequently mentioned in the answers, highlighting the need for sufficient economic resources to sustain these projects. Furthermore, terms like ‘process’, ‘scheme’, ‘contract’, and ‘payment’ suggest that setting up a PES project involves navigating complex administrative and legal landscapes. The need for long-term thinking and education or capacity building is also evident, with words like ‘future’, ‘awareness’, and

'knowledge' pointing to the necessity for ongoing stakeholder engagement and capacity-building to ensure the longevity and effectiveness of PES initiatives. Additionally, the word 'future' suggests that PES schemes need to be forward-thinking and adaptable.

Various terms for PES stakeholders, such as 'people', 'owners', 'suppliers', 'communities', 'municipalities', 'governments', and 'cities', are frequently mentioned words as well, indicating the importance of their involvement. Words like 'development', 'change', and 'opportunity' highlight the potential for integrating modern technologies and data-driven methods to enhance the monitoring and management of ecosystem services.

5.2 Key takeaways and final reflections

The summary of analysed **arrangements for operation and implementation of the identified PES cases** reveals a clear focus on regulating services, such as water management, water purification, and flood control, which dominates the landscape of marketed ecosystem services. The majority of transactions involve voluntary participation from both buyers and sellers, highlighting a **preference for mutual agreements.** The timeline shows a gradual expansion from initial implementations in the mid-20th century to a broader adoption in recent years, with a notable increase in schemes from the 1990s onwards. Project durations vary, with most being short-term but a significant number extending beyond 50 years, indicating both immediate and long-term environmental commitments. Public administrations are particularly prominent in managing longer-term projects, while private-for-profit organisations and private citizens are more engaged in shorter to medium-term initiatives. This pattern underscores a more diversified approach to ecosystem service management across Europe and a varied involvement by different types of providers with a strong commitment to regulatory services.

The review of the **design and institutional arrangements** in PES highlights a diverse and structured approach to managing ecosystem services across Europe. Public administrations are the leading buyers and providers of ecosystem services, with private citizens also playing a significant role, especially as providers and direct beneficiaries. The prevalent business model is the Private-Private partnership, reflecting self-organised agreements between private entities. Most PES projects incorporate specific conditions and robust monitoring mechanisms, with 90% including contractual requirements and 86% employing monitoring to

ensure effectiveness and accountability. These trends illustrate a strong commitment to well organised and transparent arrangements in PES, emphasising the importance of collaboration among various stakeholders and rigorous oversight to achieve sustainable outcomes.

Based on insights from PES case study experts, the funding arrangements for PES projects exhibit a **mixed effectiveness**. Local fund management, handled by entities such as regional parks and water supplies, is generally viewed favourably and seems to be a more straightforward approach compared to EU funding, which faces criticism for its complexity and bureaucratic hurdles. Although a majority of the experts believe in the long-term sustainability of PES funding arrangements, some are still sceptical. Innovative financial tools are appreciated by over 70% of respondents, yet 30% find their implementation inconsistent. EU financial support and state aid are considered crucial by nearly 90% of experts, but accessing and integrating these resources is often problematic. Local and regional, including EAFRD and Next Generation EU funds, are vital but face barriers in administrative efficiency and NGO involvement. Overall, local funding mechanisms are seen as more favourable due to their practicality, whereas EU funding programs are hindered by bureaucratic complexity.

According to the respondent´s perspectives, the analysed PES programs have notably enhanced **Human Capital** by improving access to education and clean water, with 35-50% of respondents acknowledging these benefits. However, the impact on social services, food, shelter, and healthcare is less clear, with many respondents remaining neutral or uncertain.

In terms of **Social Capital**, the evaluated PES initiatives are successful in promoting community engagement and decision-making processes, as indicated by over 60% of respondents. Efforts such as facilitating stakeholder meetings and capacity-building programs further strengthen social capital. Despite this, there is a notable gap in recognizing the role of local NGOs and measuring the broader social impacts of PES programs. Overall, while PES contributes positively to Human and Social Capital, more comprehensive assessments and enhanced stakeholder involvement are needed to fully realise and optimise these benefits.

The analyzed PES cases have positively impacted **Natural Capital** by significantly supporting job creation in natural resource management, with 90% of respondents noting this benefit. This contribution is vital for the sustainable management of natural resources, ensuring long-

term environmental and economic stability. However, the role of local communities in managing natural resources is less clear. While some communities feel they have control, this is not universally experienced, with 10% strongly disagreeing that they have adequate control. The majority of forests in the analysed PES cases are privately owned (70%), and although owners have control, the natural resources are often underutilised due to rural abandonment. Local communities are involved mainly through employment and certification efforts rather than direct management. This highlights the need for greater community engagement and improved management practices to enhance the effectiveness and inclusivity of PES programs in resource stewardship.

The analysed PES programs have had a varied impact on **Financial Capital**. While over 60% of respondents recognize PES's role in providing alternative income sources and enhancing community-wide income through initiatives like forest owner associations and certified forest products, the impact on household income is less significant, with only 15% agreeing that PES improves personal financial capital. Furthermore, the dominating negative or neutral responses regarding material wealth suggest barriers in converting ecosystem services into tangible financial gains for individuals. Overall, PES programs contribute positively to community financial stability but face limitations in substantially boosting individual household income and material wealth.

The impact on **Institutional Capital** by contributing to equitable distribution of benefits and adherence to legal frameworks has been confirmed by the analyzed PES cases, but the initiatives face barriers in transparency and community involvement. Forest owners involved in PES schemes receive benefits equally, and efforts like the Waldaktie initiative in Germany have improved the recognition of forests within natural balance. However, the focus of PES on good management practices related to biodiversity and water conservation has often only an indirect effect on local communities. Although PES adheres to legal guidelines and certification requirements, ensuring compliance with public laws, transparency issues persist. There are concerns about corruption and uneven income distribution, with some communities feeling dissatisfied with the transparency of how forest product income is managed. The role of NGOs as a facilitator helps to maintain transparency between payers and receivers, but political risks and the involvement of various organisations complicate the transparency landscape. Overall, while PES supports legal compliance and equitable benefit

distribution, it requires further improvements in transparency and community engagement to enhance its institutional effectiveness.

The implementation of PES schemes presents significant opportunities, such as enhancing public-private partnerships to address environmental challenges, increasing public awareness to boost willingness to pay for ecosystem services, and integrating modern technologies for improved monitoring and management. However, key barriers remain, including difficulties with technology integration, stakeholder disengagement, and communication issues, which can hinder effective implementation and collaboration. Financial constraints, complex bureaucracy, and limited project scope make significant barriers to long-term sustainability, as do the needs for trust and transparency among stakeholders and the awareness and capacity of participants. Addressing these barriers while leveraging the identified opportunities—such as climate change driving PES initiatives, inclusive stakeholder engagement, and clear legal frameworks— is crucial for the long-term success of PES initiatives. Effective communication strategies, including the use of social media, can foster transparency and collaboration, ultimately enhancing the viability of PES case studies.

6 Limitations

This chapter outlines the specific limitations encountered during the work on the assessment of PES-related mechanisms. The joint efforts of all partners to address them have ensured that the final outcomes remain precise and reliable. Below, we detail the key limitations and how we mitigated their impact:

6.1 Inaccurate division of promising numbers

Our initial goal was to include 200 cases to build a comprehensive dataset for our theoretical framework. However, we were able to select only 108 cases due to limited data availability. Although this reduction limited the scope of our analysis, the cases selected were carefully chosen to ensure that they provided a robust foundation for our research, maintaining the validity and reliability of our findings.

6.2 Challenges in securing respondents for surveys and interviews

We initially planned to conduct a survey with over 50 case study's experts from the overall number of 200 cases, followed by in-depth interviews to gather additional insights. As the total number of cases was limited due to the described reasons, it was also not possible to approach the target number of 50 experts from the total of 108 cases. Due to the stringent selection criteria (e.g. all relevant information available according to the defined theoretical framework) needed to ensure the precision of our results, we encountered difficulties in reaching the target number of respondents. Finally, we were able to distribute the survey to 20 case study experts, of whom 9 responded, leading to a response rate of 50%. In addition to this, we conducted thorough follow-up interviews, which enriched the data quality and ensured that the findings were comprehensive and reliable despite the smaller sample size.

Overall, while several limitations, including a reduction in study cases and a smaller-than-anticipated pool of survey respondents, the proactive measures we implemented ensured that this deliverable remains precise, reliable, and robust. The careful selection of study cases and the thorough follow-up with survey respondents allowed us to overcome these challenges and deliver valuable insights.

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8 Appendix

This appendix consists of three sections. The first section presents the complete interview guidelines used in this research, provided in English, along with the first page of the guidelines in French and Italian as examples of the available language versions. The second section includes the landing page of the online survey, offering a glimpse into the structure of the survey used for data collection. The third section provides an overview of the database framework, showing a screenshot of the Excel sheet that captures all 108 case studies and the factors involved.

8.1. Interview Guidelines

Dear Respondents,

The LIFE ProForPES project aims at collecting, synthesizing, and integrating the knowledge and the know-how already present at the national and EU level on Payments for Ecosystem Services (PES). The University of Natural Resources and Life Sciences, (BOKU) Vienna, Austria coordinates and administers this research.

Through this interview guideline, we aim to learn more about your experience with PES or PES-like projects, whether past or ongoing. This will help us fulfill our research objectives and provide guidelines and recommendations for improving PES involvement in future EU policies and financial programs.

The questions are structured into three sections: Capital Assets, Funding Arrangements, and Future Perspectives. The interview will take approximately 20 minutes to complete, and a glossary section is provided for technical terms and concepts.

Your answers will be reviewed by the Life ProForPES consortium researchers and will not be shared with third parties. You will not be identified by name or in any other recognizable way in the results or publications related to this research. Personal data will be stored on a secure server until December 2026 and will only be accessible to the researchers administering this survey. Afterward, all personal data will be deleted.

The LIFE ProForPES Team

We also provide a glossary which you can access by scanning this QR code.

Alternative link: bit.ly/ProForPESBOKU24

Questions

1. All data collected will be processed in accordance with the EU General Data Protection Regulation (GDPR). With your participation, you agree to the evaluation and publication of the results. This question is required.*
   - Yes. Please, specify: _____
   - No

2. Respondent's demography

a) Please provide your personal details

Name and surname

Institution /company

b) What is / was your role in the project?

- Project manager
- Member of the implementation team
- Admin support to the implementation
- External supporter to the implementing organization
- Other, please specify:_____

c) What is your field of expertise? (multiple answers allowed)

- Agriculture and Rural Development
- Biodiversity
- Environment and Climate
- Forestry
- Law
- Other. please specify:_____

Please provide your rating of the experience based on the considered PES case.

3. Your perception on PES and Capital Assets

Through this section we would like to collect information that can help us in assessing the extent to which PES projects represent effective environmental management tools based

on their outcomes on social, natural, financial and institutional capital assets. For that, we would like to ask your perception on the potential provision of your PES scheme to the following areas.

a) Our PES case study has improved local communities's access to…

	1 Strongly Disagree	*2 Disagree*	*3 Neutral*	*4 Agree*	*5 Strongly Agree*
Clean water					
Food					
Shelters					
Education					
Healthcare					
Social services					

b) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

c) Our PES case study has created employment opportunities in…

	1 Strongly Disagree	*2 Disagree*	*3 Neutral*	*4 Agree*	*5 Strongly Agree*
Agriculture					
Eco-tourism					
Natural resource management					

d) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

e) Our PES case study has led to improved living conditions by contributing to local economic development by…

	1 Strongly Disagree	*2 Disagree*	*3 Neutral*	*4 Agree*	*5 Strongly Agree*
Creating new jobs					
Increasing community income					
Increasing households' income					
Increasing material wealth					
Increasing alternative income opportunities					

f) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

g) Local communities in our PES projects have substantial control over their area's land use and management of natural resources:

1 Strongly Disagree	*2 Disagree*	*3 Neutral*	*4 Agree*	*5 Strongly Agree*

h) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

i) Organizations involved in our PES projects demonstrate high levels of accountability and transparency in their operations, including financial management and decision-making processes:

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

j) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

k) Our PES case study has ensured that the benefits of ecosystem services and associated interventions are distributed equitably among different social groups, addressing potential disparities and promoting inclusiveness:

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

l) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

m) Our PES case study has effectively assessed and contributed to communities' long-term viability and resilience (i.e. resource availability, environmental stability, and the ability to adapt to change):

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

n) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

o) Our PES case study has supported capacity-building programs that empower local communities (e.g. providing training, education, and skill development opportunities) that enhance their ability to engage in the project and access broader social services:

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

p) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

q) Our PES case study has promoted participatory decision-making processes that involve local communities in project design, implementation, and monitoring:

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

r) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

s) Our PES project adhered legal and regulatory measures effectively that ensured compliance with environmental laws, community rights, and project sustainability goals:

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

t) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

u) In our PES project a locally managed administration efficiently handled funds and contracts, promoting transparency and accountability in financial transactions and project expenditures.:

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

v) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

w) In our PES project local NGOs played a significant role in decision-making and implementation processes, enhancing local ownership and sustainability of project outcomes.

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

x) Please provide a short justification to your answer.

(optional but highly encouraged) :

_____

Please indicate your level of agreement with the following statements based on the considered PES case in which you are involved

4. Funding Arrangements for your PES case

a) Please identify the primary funding source of your project:

b) In your opinion…

	1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*
The primary funding sources for your PES project are sufficient and reliable.					
The funding sources for the project are well-diversified.					

	1 Strongly Disagree	*2 Disagree*	*3 Neutral*	*4 Agree*	*5 Strongly Agree*
Financial mechanisms within the PES scheme support efficient management and disbursal of funds.					
Innovative financial instruments or approaches are used in the project.					
The current funding arrangements for the PES project are sustainable in the long term (> 10 years).					
The established laws and regulations ensure the long-term financial sustainability of the PES projec					
Financial and funding challenges faced by the PES project are effectively addressed.					

Please indicate your level of agreement with the following statements. If you are unaware or have no experience with a specific aspect, please express your personal opinion.

5. PES within the Financial Frameworks

a) Are you aware of any opportunity for financial support from the regional/national/EU government for your PES scheme implementation?

b) Yes. Please, specify: _____

- No.

c) How important is the financial support from the EU government for the sustainability of PES schemes that you are/were involved in?

1 Not Important	*2 Somewhat Important*	*3 Important*	*4 Very Important*	*5 Essential*

d) Specifically, did you utilize funding from **the EU financial and state aid frameworks**?

e) Yes. Please, specify: _____

9 No

f) How critical are policy support and governance mechanisms for PES schemes to access **the EU financial and state aid frameworks**?

1 *Not Important*	*2* *Somewhat Important*	*3* *Important*	*4* *Very Important*	*5* *Essential*

g) The current **EU financial and state aid frameworks** adequately support the promotion of PES schemes in general.

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

h) There are gaps and challenges within **the EU financial and state aid frameworks** that hinder the promotion of PES schemes.

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

i) Do you have any recommendations to fill the gaps or face the challenges?

j) Policy makers and stakeholders are adequately supporting the growth and effectiveness of PES projects financed by **the EU financial and state aid frameworks.**

1 *Strongly Disagree*	*2* *Disagree*	*3* *Neutral*	*4* *Agree*	*5* *Strongly Agree*

6. Future perspectives on PES in the face of climate change

In this section, we would like to know about your perception on several future trends' prompts that we provided. This will help us to understand better how each PES projects reacts to different drivers of change in the unpredictable future.

a) With a growing population in Europe…

there will be likely more competition for natural resources, which **will motivate landowners to adopt conservation practices** due to **higher incentives for PES**.	
there will be likely an **increasing demand for PES schemes**, as the number of people willing to pay for ecosystem services will increase.	
there will be likely **less local support and fewer resources and labor forces available** for the operation of PES schemes due to the massive rate of urbanization.	
there will be likely an increasing demand for bioenergy production in the future, which will **require more incentives and support for forest managers/owners** to engage in PES.	

(1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, 6=do not know)

b) Please add a short explanation to your perception (e.g. why do you think it is favourable or not) or/and add other relevant trends that could emerge from a growing population:

c) With the advancing and ever-developing technology (digitalization, ↑ use of social media,…)

Farmers/PES managers will likely adopt modern technology and digitize their operations to **increase PES projects' efficiency, effectiveness and resilience** to climate change.	
The increasing **awareness on the importance of PES** in society will support more voluntary payments for ecosystem services.	
The **scaling up of local or regional PES schemes** will be facilitated **through better coordination and capacity building** as the global connectivity improves.	
The number of participants and stakeholders will be likely increased, as **social media enhances transparency and trust in PES schemes**.	

(1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, 6=do not know)

d) Please add a short explanation to your perception (e.g. why do you think it is favorable or not) or/and add other relevant trends that could emerge from an advancing technology:

e) With the development of economic environments…

The potential implications of changing oil prices on the timber market will likely increase the **willingness of forest owners/managers to participate in PES projects**.	
The **number of supporters of your PES project will likely increase** along with the country/region's economic growth, which will result in more private investment and public funding opportunities.	
There will be likely **less pressures on your PES project** and new opportunities for integration due to the increased overall agricultural yield	
The non-wood related ecosystem services will likely gain more importance in the society and **will boost the current PES market**.	

(1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, 6=do not know)

f) Please add a short explanation to your perception (e.g. why do you think it is favorable or not) or/and add other relevant trends that could emerge from the development of economic environments:

g) With the changing climate and environment…

Forest owners will be **less interested in participating in PES schemes** due to the increasing frequency and intensity of climate-related disasters	
The **achievement of the main PES goals and key operational aspects** of the PES project will be harder and likely **hindered**.	
The **continuation of PES projects** will be harder as the availability of natural resources and ecosystem services is hampered.	
Flexible management approaches and adaptive contract requirements within PES schemes will be needed in order to accommodate unpredictable shifts in land use and ecosystem conditions.	

(1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, 6=do not know)

h) Please add a short explanation to your perception (e.g. why do you think it is favorable or not) or/and add other relevant trends that could emerge from a changing climate and environment:

i) With the dynamics of political environments…

An i**ntensified integration with the central EU government** will be crucial to ensure a larger pool of financial resources that enable more substantial funding for PES schemes and support large-scale and long-running projects.	
Engaging with cross-sectoral actors/parties (outside of forestry/agriculture) will become more relevant in the future.	
The **future implementation** of PES schemes in the EU will increase as there is more policy support and legislation.	

(1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, 6=do not know)

j) *Please add a short explanation to your perception (e.g. why do you think it is favorable or not) or/and add other relevant trends that could emerge from the dynamics of political environments:*

"Thank you for your participation"

Directive pour les entretiens

Chers interviewés,

Le projet LIFE ProForPES vise à collecter, synthétiser et intégrer les connaissances et le savoir-faire déjà présents au niveau national et européen sur les paiements pour services écosystémiques (PSE). L'Université des ressources naturelles et des sciences de la vie (BOKU) de Vienne, en Autriche, coordonne et administre ces recherches.

Grâce à ce guide d'entretien, nous souhaitons en savoir plus sur votre expérience avec les projets PSE ou similaires, qu'ils soient passés ou en cours. Cela nous aidera à atteindre nos objectifs de recherche et à fournir des lignes directrices et des recommandations pour améliorer la participation des SPE aux futures politiques et programmes financiers de l'UE.

Les questions sont structurées en trois sections : immobilisations, modalités de financement et perspectives d'avenir. Le questionnaire prendra environ 20 minutes à remplir.

Vos réponses seront examinées par les chercheurs du consortium Life ProForPES et ne seront pas partagées avec des tiers. Vous ne serez pas identifié par votre nom ou de toute autre manière reconnaissable dans les résultats ou publications liés à ces recherches. Les données personnelles seront stockées sur un serveur sécurisé jusqu'en décembre 2026 et ne seront accessibles qu'aux chercheurs administrant cette enquête. Ensuite, toutes les données personnelles seront supprimées.

L'equipe LIFE ProForPES

Nous proposons également un glossaire de termes et concepts techniques auquel vous pouvez accéder en scannant ce code QR.

Lien alternatif : bit.ly/ProForPESBOKU24-FR

Linee guida per l'intervista

Gentile,

Il progetto LIFE ProForPES mira a raccogliere, sintetizzare e integrare le conoscenze e il know-how già presenti a livello nazionale e comunitario sui Pagamento dei Servizi Ecosistemici e Ambientali (PES). L'Università delle risorse naturali e delle scienze della vita (BOKU) Vienna, Austria, coordina e amministra questa ricerca.

Attraverso queste linee guida, miriamo a saperne di più sulla tua esperienza con schemi PES o progetti simili, passati o in corso. Questo ci aiuterà a raggiungere i nostri obiettivi di ricerca e a fornire linee guida e raccomandazioni per migliorare il coinvolgimento degli schemi PES nelle future politiche e programmi finanziari dell'UE.

Le domande sono strutturate in tre sezioni: Beni capitali , Accordi di finanziamento e Prospettive future. Il completamento dell'intervista richiederà circa 20 minuti e viene fornito un glossario per termini e concetti tecnici.

Le tue risposte verranno esaminate dai ricercatori del consorzio LIFE ProForPES e non saranno condivise con terze parti. Non sarai identificato per nome o in altro modo riconoscibile nei risultati o nelle pubblicazioni relative a questa ricerca. I dati personali saranno archiviati su un server sicuro fino a dicembre 2026 e saranno accessibili solo ai ricercatori che gestiscono questo sondaggio. Successivamente, tutti i dati personali verranno cancellati.

Grazie,

il team LIFE ProForPES

Forniamo anche un glossario a cui puoi accedere scansionando questo codice QR.

Link alternativo: bit.ly/ProForPESBOKU24-IT

8.2. Online survey

8.3. Database framework

n.	Responsible Partner	Case study database	Case study (original language): Please insert the name of the project in the original language	Case study (ENG): Please insert the name of the project in English	Type of PES: Insert the definition provided in the case study. Specify if the definition provided is our own interpretation	Starting year: Please specify the year when the project started	Is the project ongoing?	If the project is ongoing: specify the year	If the project is over: specify the year when the project ended	Country(ies): Insert the country of implementation	ES category (MEA): Please select the category(ies) exchanged through the scheme	ES considered (CICES): Please select the ES(s) exchanged through the scheme		Program Size (ha): Please specify the size of the area under the programme	ES buyer: Please specify the buyer of the ES	ES direct beneficiary(ies): Please specify the direct beneficiary of the ES	ES provider/seller: Please specify the provider of the ES
1	BOKU	InnoForESt	Habitat Bank	Finland- Habitat Bank	the transaction is voluntary	2016	Yes	2026		Finland	Regulating	Genetic resources		32.882	Private citizen	Private citizen	Private citizen
2	BOKU	InnoForESt	Love the Forest	Sweden- "Love the Forest". City of Gothenb	the transaction is voluntary	2016	Yes			Sweden	Cultural	Educational		Higher education and research	Private citizen	Private citizen	te-for-profit organiz
3	BOKU	InnoForESt	Modular furniture from National p	Austria- Modular furniture from National p	the transaction is voluntary	2011	No		2013	Austria	Provisioning	Fiber		123.98	Private citizen	te-for-profit organiz	te-for-profit organiz
4	BOKU	InnoForESt	Long lasting Institution	Czech and Slovak republic- Long Lasting In	the transaction is voluntary	2004	Yes			Czech	Regulating	Climate regulation		72.842	te-for-profit organis	Private citizen	te-for-profit organiz
5	BOKU	InnoForESt	Waldaktie	Germany-Waldaktie ("Forest shares"), Mec	the transaction is voluntary	2007	Yes			Germany	Regulating	Climate regulation	biodiversity	2317.4	Private citizen	Private citizen	te-for-profit organiz
6	BOKU	InnoForESt	Provincia Autonoma di Trento	Italy- Provincia Autonoma di Trento (Auton	the transaction is voluntary	2016	No		2018	Italy	Supporting	Genetic resources		41.3	Private citizen	Private citizen	il society organizat
7	BOKU	NOBEL	Swedish conservation performan	Sweden- The Swedish performance paym	the transaction is voluntary	1996	Yes			Sweden	Regulating	Water regulation			Public Administratio	Private citizen	Private citizen
8	BOKU	NOBEL		Italy- LifeT Malting Good Natura (MGN)	the transaction is voluntary	2012	No		2016	Italy	Provisioning	Genetic resources			Private-for-profit organis	te-for-profit organiz	'ublic Administratio
9	BOKU	NOBEL	Wasserversorgung München im A	Germany-The Mangfalltal catchment arec	the transaction is voluntary	1992	No		2010	Germany	Regulating	Water purification		58000	Private citizen	Private citizen	te-for-profit organiz
10	BOKU	PESforWater	SPUG	Spain - Special Plan for the Upper Guadia	the transaction is not volun	2008	Yes			Spain	Provisioning	water			Public Administratio	te-for-profit organis	Private citizen
11	BOKU	PESforWater		Spain - Hydrologic-Forestal National Plan i	the transaction is not volun	1942	Yes			Spain	Regulating	Water regulation			Private citizen	te-for-profit organis	'ublic Administratio
12	BOKU	PESforWater		Spain - Hydrologic-Forestal National Plan i	the transaction is not volun	1948	No		1970	Spain	Regulating	Water regulation			Public Administratio	te-for-profit organis	'ublic Administratio
13	BOKU	PESforWater		Spain - Hydrologic-Forestal National Plan i	the transaction is not volun	1940	No		1971	Spain	Regulating	Water regulation		24100	Public Administratio	te-for-profit organis	'ublic Administratio
14	BOKU	PESforWater		Spain - Hydrologic-Forestal National Plan i	the transaction is not volun	1950	No			Spain	Regulating	Water regulation			Public Administratio	te-for-profit organis	'ublic Administratio
15	BOKU	PESforWater		Spain - Hydrologic-Forestal National Plan i	the transaction is voluntary	1948	No			Spain	Regulating	Water regulation			Public Administratio	te-for-profit organis	'ublic Administratio
16	BOKU	PESforWater		Spain - Aguas Font Vella y Lanjarón S.A.	the transaction is voluntary from the seller and t		Yes			Spain	Regulating	Soil formation			Private citizen	te-for-profit organis	'ublic Administratio
17	BOKU	PESforWater		Spain - Land stewardship project - Obra S	the transaction is voluntary	1998				Spain	Regulating	Water regulation			Private-for-profit organis	Private citizen	te-for-profit organiz
18	BOKU	PESforWater	Bosques maduros	Spain - Mature forest reserves	the transaction is voluntary	2008				Spain	Regulating	Water regulation			Civil society organizat	Private citizen	Private citizen
19	BOKU	PESforWater		Spain - A voluntary agreement for river res	the transaction is voluntary	2002				Spain	Regulating	Water regulation			Public Administratio	te-for-profit organis	te-for-profit organiz
20	ER	SINCERE	Bosco Limite	Limite woodland		2012	Yes			Italy	Regulating	Water regulation		2,35 ha	Public	Private citizen	Private citizen
21	ER	SINCERE	Arte Sella	Land Art in Sella Valley	the transaction is	1989	Yes			Italy	Cultural	Aesthetic			Private citizen	Private citizen	Other
22	ER	SINCERE	Boschi Vivi	Living Woodlands	the transaction is	2016	Yes			Italy	Cultural	piritual and religious		11 ha	Private citizen	Private citizen	Private-for-profit
23	ER	SINCERE	Asilo nel Bosco di Ostia	Forest Kindergarten of Ostia	the transaction is	2012	Yes			Italy	Cultural	Educational			Private citizen	Private citizen	Other
24	ER	SINCERE	Bosco del Sorriso	The woodland of happiness	the transaction is	2012	Yes			Italy	Cultural	reation and ecotourism		100 t m2	Private citizen	Private citizen	Public
25	ER	SINCERE	Niedersachsen, OOWV	Lower Saxony, Groundwater Protection	the transaction is	1987	Yes			Germany	Provisioning	Water regulation		8000 t m2	Private-for-profit	Private citizen	Private citizen
26	ER	SINCERE	Wasserentnahmegeld / "Wasserp	water extraction money / "water penny"		1988/2015	Yes			Germany	Regulating	Water regulation			Private citizen		
27	ER	SINCERE	Bionade-Trinkwasserwald	Bionade-Trinkwasserwald	the transaction is	2008	Yes			Germany	Regulating	Water purification			Private-for-profit	Private-for-profit	Private citizen
28	ER	SINCERE	Kaufering scheme	Kaufering scheme	the transaction is	2008	Yes			Germany	Regulating	Water purification			Private-for-profit	Public	Private citizen
29	ER	SINCERE	FriedWald	Forest Cemetery	the transaction is	2001	Yes			Germany	Cultural	piritual and religious			Private citizen	Private citizen	Private-for-profit
30	ER	SINCERE	RuheForst	Woodland Burial site	the transaction is		Yes			Germany	Cultural	piritual and religious			Private citizen	Private citizen	Private-for-profit
31	ER	SINCERE	WildOulanta	WildOulanta	the transaction is	2016	Yes			Finland	Cultural	reation and ecotourism		1000ha	Private-for-profit		Private citizen
32	ER	SINCERE	Green Heart of Cork	Green Heart of Cork	the transaction is	2008				Portugal	Provisioning	Fiber		16000 / 600ha	Private-for-profit	Private citizen	Private citizen
33	ER	SINCERE	Til-Tops Aktivitetsparter	Til-Tops outdoor activity parks	the transaction is		Yes			Denmark	Cultural	reation and ecotourism			Private-for-profit	Private citizen	Private citizen
34	ER	SINCERE	MTB-sporet Hammel	MTB tract Hammel	the transaction is	2014	Yes			Denmark	Cultural	reation and ecotourism			Private citizen	Private citizen	Private citizen
35	ER	SINCERE	Copenhagen Energy Scheme	Copenhagen Energy Scheme	the transaction is	1994	Yes			Denmark	Regulating	Water purification		95ha	Private citizen	Private citizen	Private citizen
36	ER	SINCERE	Water Supply Act Reforestation L	Water Supply Act Reforestation levy	the transaction is		Yes			Denmark	Regulating	Water purification			Private-for-profit	Private citizen	Public
37	ER	SINCERE	Rusensti Lom pilot	Rusensti Lom pilot PES scheme	the transaction is	2010	Yes			Bulgaria	Cultural	reation and ecotourism			Private-for-profit	Private citizen	Civil society
38	ER	SINCERE	Golfe de Saint Tropez fire protect	Golfe de Saint Tropez fire protection scher	the transaction is	2011				France	Regulating	Water regulation			Public	Private citizen	Private citizen
39	ER	SINCERE	Volvic Catchment Protection Par	Volvic Catchment Protection Partnership	the transaction is	2007	Yes			France	Provisioning	Water purification		3800ha	Private-for-profit	Private citizen	Private citizen
40	ER	SINCERE	Drumul Moștenirii Maramureșene	Maramures heritage trail	the transaction is	2010	Yes			Romania	Cultural	reation and ecotourism		trail in a 45000ha are	Other	Private citizen	Public
41	ER	SINCERE	Parc Aventura Brasov	Adventure Park Brasov	the transaction is	2007	Yes			Romania	Cultural	reation and ecotourism			Private citizen	Private citizen	Other
42	ER	SINCERE	Diventare Alberi	Becoming Trees	the transaction is					Italy	Cultural	piritual and religious			Private citizen	Private citizen	Other
43	ER	DrissPES	Environmentally Sensitive Area Sc	Environmentally Sensitive Area (ESA) Scher	the transaction is	1986	No	-	2014	United Kingdom	Regulating	Cultural heritage		640000 ha	Public	Private citizen	Private citizen
44	ER	DrissPES	Countryside Stewardship Scheme	Countryside Stewardship Scheme (CSS)	the transaction is	1991	No	-	2014	United Kingdom	Regulating	Cultural heritage		530620 ha	Public	Private citizen	Private citizen
45	ER	DrissPES	Northeim-Mode	Northeim-Mode	the transaction is	2004	Yes	-	2010/2011	Germany	Regulating	Genetic resources		774 ha	Civil society	Private citizen	Private citizen
46	ER	DrissPES	PWS en Munich	PWS en Munich	the transaction is	1993	Yes	Unknown	-	Germany	Regulating	Water regulation		1800 ha	Public	Public	Private citizen
47	ER	DrissPES	Vittel (Nestlé Waters)	Vittel (Nestlé Waters)	the transaction is	1993	Yes	Unknown	-	France	Regulating	Water purification		6000 ha	Private-for-profit	Private-for-profit	Private citizen
48		PESforWater	Trinkwasserschongebiet Waidhof	Austria - Drinking water protection zone W	the transaction is voluntary	2018	Yes	t now (long term duration >10yrs)		Austria	Regulating	Water regulation		30	'ublic Administratio	Private citizen	Private citizen
49		PESforWater	Trinkwasserversorgung Basel	Switzerland - Basel drinking water suppliers	the transaction is voluntary	1920	Yes	t now (long term duration >10yrs)		Switzerland	Regulating	Water regulation		200	Private citizen	Private citizen	Private citizen
50		PESforWater	Baden Forst & Brauerei Müller AG	Switzerland - Baden Forest & Brewery Mülle	the transaction is voluntary	1999	Yes	w (medium term btw 5 and 10 years)		Switzerland	Regulating			500	te-for-profit organis	Private citizen	Private citizen
51		PESforWater	Uuhitonoja	Finland - Uuhitonoja	the transaction is voluntary	2018	Yes	not know (short term < 5 yrs)		Finland	Regulating	Water regulation	Genetic resources	1200	il society organizat	Private citizen	Private citizen
52		PESforWater	Platba za odber povrchovej vod	Slovatia - Payment for surface water	the transaction is voluntary	2007	Yes	t now (long term duration >10yrs)		Slovatia	Regulating			5707	te-for-profit organis	Private citizen	'ublic Administratio
53		PESforWater	Platba za odber povrchovej vod	Slovatia - Payment for surface water	the transaction is voluntary	2007	Yes	t now (long term duration >10yrs)		Slovatia	Regulating			4393	te-for-profit organis	Private citizen	'ublic Administratio
54		PESforWater	ПП Русенски Лом	Bulgaria - Rusensti Lom Nature Park	the transaction is voluntary	2010	Yes	not know (short term < 5 yrs)		Bulgaria	Regulating	Water purification	Genetic resources	3408	Private citizen	Private citizen	Other
55		PESforWater	Trinkwasserwald	Germany - Forests for Drinking Water	the transaction is voluntary	1995	Yes	t now (long term duration >10yrs)		Germany	Regulating	Water regulation	Genetic resources	participating in the	te-for-profit organis	Private citizen	'ublic Administratio
56		PESforWater	Gewährung von Zuwendungen f	Germany - Lower Saxony cooperation mo	the transaction is not volun	1992	Yes	t now (long term duration >10yrs)		Germany	Regulating	Water regulation		298000	Private citizen	Private citizen	'ublic Administratio
57		PESforWater	Steinbachtalsperre	Germany - Steinbachtal Dam	the transaction is not volun	1966	Yes	t now (long term duration >10yrs)		Germany	Regulating	Water purification		1460	'ublic Administratio	Private citizen	'ublic Administratio
58		PESforWater	Große Dhünn Talsperre	Germany - Big Dhünn Dam	the transaction is not volun	1988	Yes	t now (long term duration >10yrs)		Germany	Regulating	Water regulation	reation and ecotou	955.2	'ublic Administratio	Private citizen	'ublic Administratio
59		PESforWater	Umsetzung der EU-Agrarreform in	Germany - Greening: Implementation of tl	the transaction is not volun	2015	Yes	w (medium term btw 5 and 10 years)		Germany	Regulating	Water purification	Cultural heritage	NA	'ublic Administratio	Private citizen	'ublic Administratio
60		PESforWater	The Green Heart of Cork project	Portugal - The Green Heart of Cork project	the transaction is voluntary	2010	Yes	short term project, but until now it is still going on		Portugal	Regulating			600	te-for-profit organis	Private citizen	Private citizen
61		PESforWater	Nat nada za korištenje opće tois	Croatia - Payments for environmental fore	the transaction is not volun	unknown	No			Croatia	Regulating	Water purification	Genetic resources	NA	'ublic Administratio	Private citizen	'ublic Administratio
62		PESforWater	Quota tariffa idrica per interventi	Italy - Water tariff fee for maintanance of r	the transaction is not volun	1997	Yes	t now (long term duration >10yrs)		Italy	Regulating	Water regulation	Genetic resources	NA	'ublic Administratio	Private citizen	'ublic Administratio
63		PESforWater	Canoni ambientali della Provinci	Italy - Water-Environmental fees of Trento P	the transaction is not volun	2011	Yes	t now (long term duration >10yrs)		Italy	Regulating	Water purification		NA	'ublic Administratio	Private citizen	'ublic Administratio
64		PESforWater	Diga di Ridracoli - Romagna Acc	Italy - Ridracoli Dam (Romagna Water func	the transaction is not volun	1988	Yes	t now (long term duration >10yrs)		Italy	Regulating	Water regulation		NA	'ublic Administratio	Private citizen	'ublic Administratio
65		PESforWater	Interventi di valorizzazione del se	Italy - Monte Carpegna Drinking Water	the transaction is voluntary	2016	Yes	not know (short term < 5 yrs)		Italy	Regulating	Water purification	Cultural heritage	NA	'ublic Administratio	Private citizen	Other
66		PESforWater	Custodia del territorio	Italy - Land stewardship	the transaction is voluntary	2007	Yes	I do not know		Italy	Regulating	Water purification		NA	Other	Private citizen	Private citizen
67		PESforWater	Bosco Limite	Italy - Bosco Limite Infiltration Area	the transaction is voluntary	2013	Yes	uration of the case study was not defined		Italy	Regulating	Water regulation	reation and ecotou	2.5	Other	Private citizen	Private citizen
68		PESforWater	Ecopay Connect Oglio Sud	Italy - Ecopay Connect Oglio Sud	the transaction is voluntary	2018	Yes	w (medium term btw 5 and 10 years)		Italy	Regulating	reation and ecotourism		20	te-for-profit organis	Private citizen	'ublic Administratio
69		PESforWater	Közösségi jelentőségű ártéri élőh	Hungary - Conservation of alluvial habitat	the transaction is voluntary	2009	No		2013	Hungary	Regulating	Water regulation	reation and ecotou	100	Other	Private citizen	'ublic Administratio
70		PESforWater	Aalborg case	Denmark - Aalborg case	the transaction is voluntary	2002	Yes	t now (long term duration >10yrs)		Denmark	Regulating			1500	'ublic Administratio	Private citizen	Private citizen
71		PESforWater	Brylle vandskov	Denmark - Brylle forest for water	the transaction is voluntary	2017	Yes	t now (long term duration >10yrs)		Denmark	Regulating			132	Other	Private citizen	te-for-profit organiz
72		PESforWater	Elmelund Skov	Denmark - Elmelund Forest	the transaction is voluntary	2001	Yes	t now (long term duration >10yrs)		Denmark	Regulating			380	'ublic Administratio	Private citizen	Private citizen
73		PESforWater	Native Woodland Scheme (NWS)	Ireland - Native Woodland Scheme (NWS)	the transaction is voluntary	2014	Yes	w (medium term btw 5 and 10 years)		Ireland	Regulating	Water regulation	Genetic resources	NA	'ublic Administratio	Private citizen	Private citizen
74		PESforWater	KerryLife Project	Ireland - KerryLife Project	the transaction is voluntary	2014	Yes	w (medium term btw 5 and 10 years)		Ireland	Regulating	Water regulation	Genetic resources	NA	'ublic Administratio	Private citizen	Private citizen
75		PESforWater	Novy Prales	Czech Republic - New "Virgin Forest"	the transaction is voluntary	2004	Yes	t now (long term duration >10yrs)		Czech Republic	Regulating	reation and ecotourism		40	Private citizen	Private citizen	Other
76		PESforWater	Boisements de protection de la v	France - Planting protection forests in Renr	the transaction is not volun	1996	Yes	t now (long term duration >10yrs)		France	Regulating			2240	'ublic Administratio	Private citizen	Private citizen
77		PESforWater	Syndicat des Eaux des Moises - P	France - Partnerships between Water Reso	the transaction is voluntary	2011	Yes	t now (long term duration >10yrs)		France	Regulating	Water regulation		1800	Other	Private citizen	Private citizen
78		PESforWater	Vittel - Schema de compensation	France - The Vittel Payment Scheme for im	the transaction is voluntary	1992	Yes	t now (long term duration >10yrs)		France	Regulating			10000	te-for-profit organis	Private citizen	Private citizen