LIFE ProForPES
PROMOTING FOREST PAYMENTS FOR ECOSYSTEM SERVICES

Co-funded by the European Union

Preliminary guidelines and recommendations

D4.1 - Preliminary options for integration of PES and PES- related mechanisms to EU-framework programmes

Edited by

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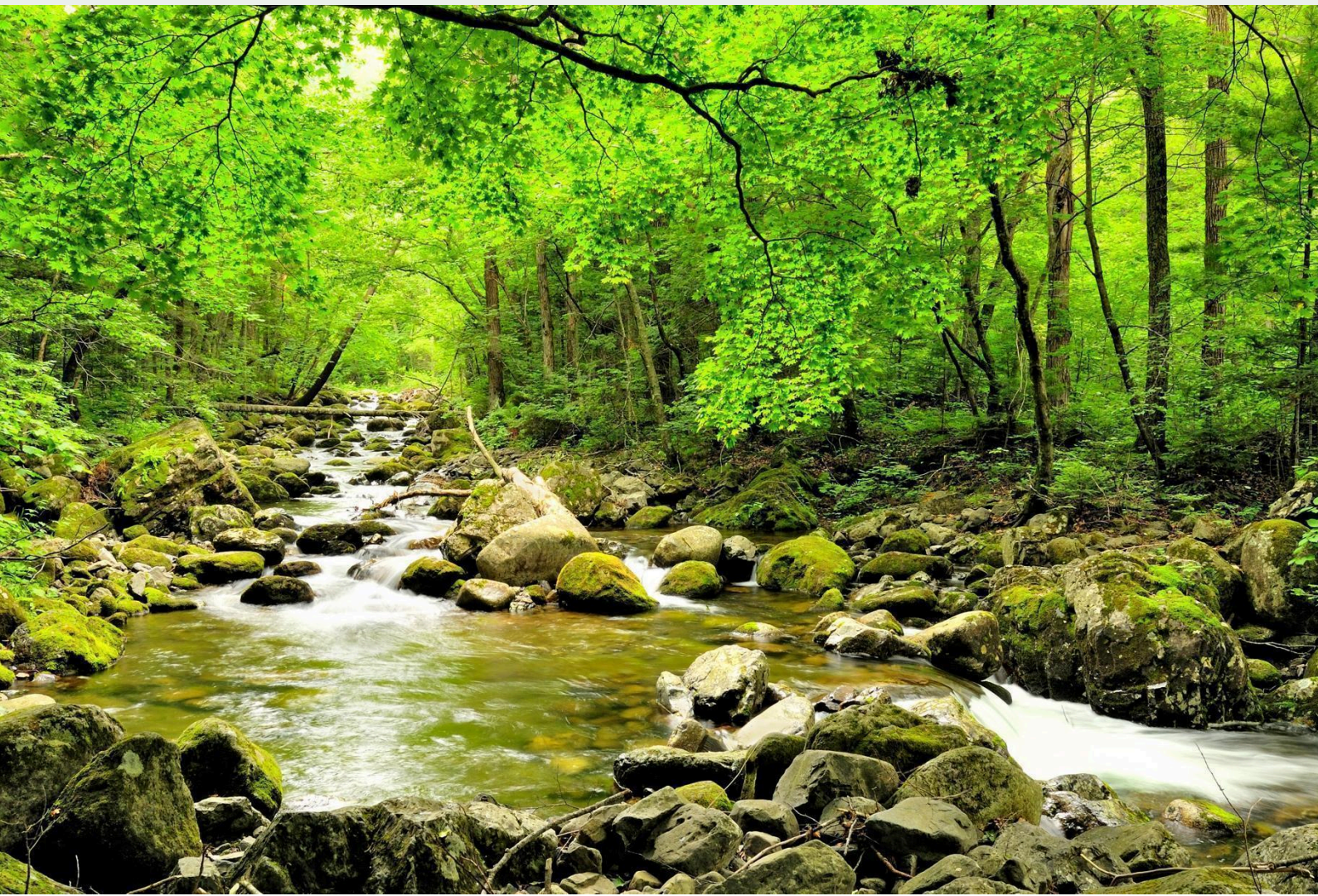

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About the project
Payments for ecosystem services (PES) schemes are considered a promising economic instrument for diversifying income to forest owners and rural communities while supporting biodiversity and climate mitigation. LIFE ProForPES is a EU funded project that aims at collecting, synthesising and integrating the knowledge and the know-how already present at the national and EU level on PES and PES-like schemes.

Project Partners

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1. Introduction

1.1 Purpose and scope of WP4

Work Package 4 (WP4) aims to provide guidelines and recommendations for future funding programmes based on the results of the previous two work packages and on key stakeholder comments and feedback collected through dedicated consultations. Within the overall logic of LIFE ProForPES, WP4 translates the analytical findings developed earlier in the project into practical orientations for the future integration of Payments for Ecosystem Services (PES) and PES-related mechanisms into EU funding programmes.

This deliverable focuses on Task 4.1(preliminary options and recommendations) and constitutes the first structured step in the development of preliminary guidelines and recommendations. Building on the results of the previous work packages, it provides a written report with several options, formulated as scenarios, on how PES schemes could be incorporated into EU funding programmes.

As a minimum, these options distinguish between seven core design themes: different forest ecosystem services, or bundles thereof, on which the mechanism is focused; the temporal framework within which mechanisms could be incorporated into EU funding programmes; the geographical scope of the mechanisms' application; the estimated financial framework; implementation control systems; the payment design; and the ways in which financial programmes can promote PES. In this deliverable, these dimensions form the common structure used to develop, present, and compare the preliminary scenarios and their related recommended options.

The task focuses on a descriptive assessment of which combinations of these factors may be compatible with one another and therefore refrains from prioritisation, normative judgements, or the assessment of political priorities. At the same time, it draws on broader lessons from PES design and implementation, including issues such as spatial targeting, payment differentiation, conditionality, collective contracts, feasibility, and sustainability across different contexts. In this sense, scenarios serve as the main analytical vehicle through which preliminary recommendations are structured. Each scenario represents a coherent combination of design features across the seven themes, allowing different PES configurations to be explored and compared.

This structure is consistent with the wider project pathway. WP2 provides the analytical basis for the participatory design of future funding programmes within WP4, while WP3 examines the potentials, opportunities, and limits of PES design and integration into EU funding programmes and develops a scenario-based policy assessment process concerning the future integration of PES into further EU policy instruments. WP4, in turn, develops preliminary guidelines and recommendations through several scenarios showing how PES schemes could be incorporated into EU funding programmes. The present deliverable is therefore grounded in the analytical work already carried out on PES and PES-related mechanisms in Europe, on enabling conditions and barriers, and on the gaps and opportunities for integration within the EU funding framework.

The broader WP4 process also includes stakeholder consultation and workshop-based discussion. In the overall sequence of WP4, these elements are relevant because they create the basis for the subsequent co-design of guidance and recommendations with

relevant stakeholders. However, the present deliverable remains centred on Task 4.1 and therefore focuses on the development of preliminary options and recommendations for the integration of PES and PES-related mechanisms into EU funding programmes. The scenarios and related recommended options presented here constitute the starting point for the next step of WP4. The formal joint evaluation of these scenarios, their modification on the basis of stakeholder feedback, and the co-design of final recommendations belong to Task 4.2.

1.2 Why PES integration into EU funding programmes matters

The integration of Payments for Ecosystem Services (PES) and PES-related mechanisms into EU funding programmes matters because forest ecosystem services are increasingly recognised as essential for climate mitigation and adaptation, biodiversity conservation, water regulation, soil protection, and wider societal well-being. Across the EU policy landscape, this recognition has become more visible through the European Green Deal, the EU Biodiversity Strategy for 2030, and the EU Forest Strategy for 2030, all of which strengthen the policy relevance of ecosystem services and support the development of financial incentives for their provision. In particular, the Forest Strategy for 2030 explicitly links the multifunctional role of forests to the need to support forest owners and managers through financial incentives for the provision of ecosystem services, while the Biodiversity Strategy promotes the development of innovative financial incentives and result-based approaches.

At the same time, the project's analytical work shows that the practical uptake of PES across Europe remains uneven and often constrained by design, governance, and funding challenges. The analysis of PES and PES-related mechanisms in Europe highlights that, although a broad variety of arrangements exists, many schemes remain strongly context-dependent and face difficulties related to transaction costs, low payment levels, legal uncertainty, information gaps, and barriers to participation. The evidence also shows that EU financial support and state aid are considered important for PES development, but that access to these resources is often hindered by administrative complexity and bureaucratic burdens. In many cases, local or regional funding arrangements are perceived as more workable than EU-level schemes because they are easier to access and better adapted to local realities.

The SWOT analysis further confirms that the successful implementation of PES depends not only on funding availability, but also on institutional and political support, effective governance, monitoring capacity, and the existence of clear and workable implementation conditions. High transaction costs, bureaucratic burdens, fragmented decision-making, lack of coordination, and insufficient long-term support remain major obstacles. At the same time, the European context also offers important enabling conditions, including growing environmental awareness, relatively high levels of education and access to information, institutional legitimacy, and increasing public and private interest in investing in nature-based solutions. These conditions suggest that the challenge is not whether PES is relevant, but how it can be better structured and integrated into supportive policy and funding frameworks.

Within LIFE ProForPES, this is precisely where EU funding programmes become important. The wider project is designed to promote a more effective integration of PES and PES-like schemes within the EU financial framework, with the ambition of increasing both the implementation and the effectiveness of these mechanisms at European level.

Earlier work packages therefore examine both the practical experience of PES in Europe and the gaps and opportunities for integrating these mechanisms into funding programmes and state aid frameworks. In this context, integrating PES into EU funding programmes is not only a policy opportunity, but also a practical necessity for moving beyond isolated case-specific schemes toward more stable, scalable, and operationally supported approaches.

1.3 How this deliverable is structured

This deliverable is structured to move from the overall mandate of WP4 and Task 4.1 to the development of preliminary options and recommendations for the integration of PES and PES-related mechanisms into EU funding programmes. Following this introductory section, the report presents the recommendation framework and explains the rationale for the selected approach, the evidence base on which it builds, and the method used to develop the scenarios and their related recommended options.

The core of the deliverable is then organised around the preliminary scenarios, which constitute the main analytical vehicle for exploring how PES schemes could be incorporated into EU funding programmes under different configurations of design features, implementation conditions, and programme characteristics. Each scenario is presented through a common structure, allowing the different options to be compared consistently across the main dimensions defined for Task 4.1.

The deliverable also includes a section on stakeholder co-design and workshop preparation within the broader WP4 process. In the context of this report, this section explains how the preliminary scenarios and recommended options are prepared for stakeholder discussion and how the workshop design supports the subsequent validation and refinement process. The formal validation, modification of scenarios, and co-design of final recommendations are part of Task 4.2.

The report concludes with a synthesis of the main cross-cutting observations emerging from the preliminary scenarios, together with reflections on their relevance for future EU funding programmes. In this way, the deliverable combines an analytical function, by structuring and presenting preliminary options, with a preparatory function, by establishing the foundation for the subsequent co-design of final guidance and recommendations within WP4.

2. Framework for developing recommendations for integrating PES into EU funding programmes

2.2 Recommendation development method

The preliminary recommendations presented in this deliverable were developed through a scenario-based method designed to identify plausible and policy-relevant pathways for integrating Payments for Ecosystem Services (PES) and PES-related mechanisms into EU funding programmes. Rather than proposing a single optimal model, the method focuses on constructing coherent combinations of PES design features that are compatible with different ecological objectives, governance contexts, funding architectures, and stakeholder roles. This responds directly to the logic of Task 4.1, which requires the

development of several PES policy options, formulated as scenarios, on how PES schemes could be incorporated into EU financial programmes, while maintaining a descriptive rather than normative perspective.

This scenario-based method was selected because PES design is inherently context-dependent. Earlier project work in WP2 and WP3 has shown that PES and PES-related mechanisms across Europe vary widely in their objectives, payment structures, governance arrangements, monitoring systems, and funding sources, and that their feasibility depends on how these elements are combined in practice. The method therefore treats PES schemes not as a single policy instrument with one preferred form, but as configurable combinations of design elements whose compatibility determines their feasibility, administrative workability, and long-term sustainability.

The following subsections explain the evidence base, the common design themes used to structure the scenarios, and the process through which the scenarios and their related recommended options were developed.

2.2.1 Evidence base for the development of preliminary options

The preliminary options and recommendations presented in this deliverable were developed on the basis of multiple sources of empirical and analytical evidence generated within LIFE ProForPES and complemented by relevant academic literature, policy analysis and stakeholder consultation in previous workshops. This reflects the overall logic of WP4, which builds on the results of the previous work packages in order to formulate structured options for the future integration of PES and PES-related mechanisms into EU funding programmes. In methodological terms, the scenario development process drew on both project-internal findings and broader conceptual insights in order to ensure that the preliminary options were not only policy-relevant, but also grounded in operational experience, implementation constraints, and established PES design principles.

Source 1. Analysis of PES and PES-related mechanisms in Europe (WP2-D2.2)

A first major source was the analysis of PES and PES-related mechanisms across Europe developed in WP2 Deliverable 2.2. That work compiled and examined more than 100 PES and PES-like cases across Europe, drawing on previous EU projects, surveys, and interviews to identify operational arrangements, institutional settings, financial and funding structures, and barriers and opportunities for project success. The analysis provided a broad empirical picture of how PES-related mechanisms currently function in practice, including their diversity of objectives, governance arrangements, funding sources, and implementation models. It also offered insights into the feasibility and scalability of innovative approaches and highlighted the importance of design and institutional conditions in shaping project performance.

Source 2 . SWOT assessment of enabling conditions and barriers (WP2-D2.3)

A second key source was the SWOT assessment in Deliverable 2.3, which examined enabling conditions, barriers, strengths, and weaknesses affecting PES implementation. Building on case-based evidence, literature review, and stakeholder input, the SWOT analysis provided lessons on governance quality, financial constraints, bureaucratic burden, participatory engagement, monitoring needs, and long-term sustainability. It also functioned explicitly as background information for the participatory design of future

funding programmes within WP4. For the present deliverable, this material was particularly important in identifying which types of design combinations appear more robust, where implementation risks are likely to emerge, and what practical conditions need to be considered when formulating preliminary options and recommendations.

Source 3. Gaps and potential for PES integration in the EU financial framework (WP3)

A third key source consisted of the financing and governance insights developed in WP3, including the policy and financial-programme screening, the Delphi study, and the workshop-based assessment process. As presented in the WP3 material (D3.1 and D3.2), this work combined the review of 46 EU policy documents across seven policy sectors, the screening of 31 EU financing programmes for the 2021–2027 period, expert-based assessment through a two-round Delphi process, and a workshop involving 62 participants from 16 countries working across four future scenarios on future PES design. Together, these activities provided an important bridge between the empirical analysis of PES practice and the forward-looking orientation of WP4. They generated evidence not only on the current policy and funding context for PES, but also on how stakeholders and experts assess future PES options under different governance and financing conditions.

This WP3 evidence was particularly important for the development of preliminary PES policy options in three respects. First, it highlighted a persistent gap between the growing recognition of ecosystem services in EU policy and the more limited operational concretisation of PES design as well as financial commitments. Second, it showed that PES terminology remains unevenly understood and mixed used, and that simpler, more accessible framing may be needed for wider engagement. Third, both the expert and workshop results pointed towards the relevance of hybrid PES approaches, including combinations of public and private finance and combinations of action-based core payments with result-based incentives, as stakeholder/expert preferred design features. At the same time, the WP3 findings underlined that such approaches require strong governance, i.e. regulations that provide a clear framework, public oversight, clear conditionality, and workable monitoring, reporting, and verification systems. These insights directly informed the formulation of scenarios and recommended options in the present deliverable.

Source 4. PES design principles in academic and policy literature

In addition to the project-generated evidence, the development of preliminary options also drew on established PES design principles in the academic and policy literature. This was important in order to interpret the project findings within a wider conceptual understanding of PES design and implementation. Issues such as conditionality, payment differentiation, collective arrangements, administrative feasibility, monitoring burdens, and the relationship between ecological outcomes and contractual design were considered as part of the analytical process. The methodological note makes clear that this wider literature was used not to impose an abstract model, but to support the construction of realistic and policy-relevant combinations of design features.

Source 5. Relevant EU policy frameworks and financial instruments

Finally, relevant EU policy frameworks and financial instruments also formed part of the evidence base. This was necessary because the task is not limited to analysing PES in isolation, but specifically concerns how PES schemes could be incorporated into EU

funding programmes. The project proposal and the WP3 work both emphasise that financial programmes can promote the creation and use of PES schemes, incentivise the supply or demand of forest ecosystem services, or support related policy development. The analysis of more recent EU documents further suggests that, although many policies remain high-level, some frameworks such as the CAP, the Carbon Removal Certification Framework and the Nature Restoration Regulation provide clearer operational reference points for future PES integration. These policy and programme insights therefore helped situate the preliminary options within realistic institutional and funding contexts.

Taken together, these sources provided the empirical grounding, analytical structure, and policy orientation needed to develop preliminary scenarios and their related recommended options. They ensured that the options presented in this deliverable are informed by observed European experience, by lessons on barriers and enabling conditions, by the institutional realities of EU funding programmes, and by the wider knowledge base on PES design and implementation.

2.2.2 Structuring the preliminary options: the seven design themes

Purpose and function of the seven-theme framework

To ensure coherence and comparability across the preliminary options, the scenario framework was structured around seven common design themes: f**orest ecosystem services targeted; temporal framework; geographical scope; financial framework; implementation control systems; payment design; and promotion and facilitation mechanisms within the programme** . These themes were defined in the project logic for Task 4.1 and further operationalised in the methodological work developed for the preparation of the scenarios. Their purpose is to provide a consistent analytical structure for describing how PES schemes may be incorporated into EU funding programmes under different configurations of design features, funding arrangements, implementation requirements, and governance conditions.

At this stage, the function of the framework is descriptive rather than evaluative. The seven themes do not determine which option is preferable in normative or political terms. Instead, they identify the main dimensions along which PES design may vary and make it possible to organise a diverse set of preliminary options in a transparent and comparable way. This is consistent with the methodological note, which emphasises compatibility rather than optimisation: the scenarios do not represent “best” solutions, but combinations of options that can plausibly work together within EU governance realities.

Using a common framework was also necessary because the evidence base from WP2 and WP3 points to substantial diversity in PES and PES-related mechanisms design and use across Europe. Existing PES schemes differ in the ecosystem services targeted, the duration of commitments, the scale of application, the source and structure of funding, the type of monitoring applied, the form of contractual conditionality, and the extent of institutional support needed for uptake. The seven-theme framework therefore provides a practical way of bringing this diversity into a shared structure that supports the development of preliminary options and recommendations, while also enabling the analysis of how different combinations of design features influence the feasibility and long-term sustainability of PES schemes within EU funding programmes.

Overview of the seven design themes

The seven themes mentioned earlier (forest ecosystem services targeted; temporal framework; geographical scope; financial framework; implementation control systems;payment design; and promotion and facilitation mechanisms within the programme) used to structure the preliminary recommended options. Together, they summarise the main design variables that shape how PES schemes function in practice and how they may be embedded in EU funding programmes.

The table below summarises these themes and the potential recommended options considered under each. These categories are intended to capture the main families of options that emerged from the project evidence and the wider PES literature. They do not represent an exhaustive list of all possible alternatives, but a structured basis for the development of realistic and policy-relevant preliminary scenarios.

Table 1. Structure used to select recommended options

Design Theme	Possible recommended options categories
Forest ecosystem services targeted	Single service vs bundled services; provisioning, regulating, cultural services
Temporal framework	Short-term pilots, medium contracts, long-term commitments
Geographical scope	Uniform national schemes, targeted areas, functional landscapes
Financial framework	EU public funding, national/state aid, private funding, mixed models
Implementation control systems (MRV)	Results-only monitoring, practice compliance, remote sensing, modelling
Payment design	Action-based, results-based, hybrid, collective schemes
Promotion and facilitation mechanisms	Information campaigns, advisory support, intermediaries, regulatory integration, coordination

Explanation of the design themes and recommended option categories

Each of the seven themes captures a distinct aspect of PES design.

The first theme, **forest ecosystem services targeted**, refers to the specific ecosystem service, or bundle of services, on which the mechanism is focused. This may involve a single service, such as biodiversity protection or watershed regulation, or bundled services where multiple benefits are jointly supported. The methodological note indicates that the selection of targeted services was guided by policy relevance, ecological and social importance, and feasibility of operationalisation within financial programmes. Where appropriate, bundled services were considered because many PES schemes in practice generate multiple benefits even if payments focus on one primary service.

The second theme, **temporal framework**, concerns the duration and continuity of the mechanism. The main categories considered range from short-term pilots to medium-term contracts and long-term commitments. This theme is important because contract duration must reconcile ecological timeframes, programme cycles, policy flexibility, and the willingness of landowners and managers to participate. The methodological note highlights that very short contracts may limit ecological impact, whereas very long contracts may reduce participation and adaptability; for this reason, medium-term commitments with periodic review were often considered a workable intermediate option.

The third theme, **geographical scope**, refers to the spatial logic of PES implementation. The options considered include broad territorial schemes, targeted areas, and functionally defined landscapes. Earlier evidence suggests that PES effectiveness generally improves when payments are directed to areas where ecological additionality is highest, such as biodiversity hotspots, source catchments, hazard-prone regions, or other functionally connected landscapes. For this reason, geographically targeted approaches are often more relevant than uniform nationwide schemes, unless the service itself justifies broader coverage.

The fourth theme, **financial framework**, captures the main funding architecture supporting the scheme. The categories considered include EU public funding, national or state-aid-based funding, private funding, and mixed public-private models. This distinction is important because earlier work in WP2 and WP3 showed that funding stability, source diversity, and compatibility with programme rules are central to PES feasibility and sustainability. The methodological note further indicates that successful schemes often rely on a stable core source of funding, potentially complemented by secondary contributions, while beneficiary-pays logic may also be relevant in some contexts.

The fifth theme, **implementation control systems**, concerns the way compliance or outcomes are verified. The categories considered include results-only monitoring, practice compliance, remote sensing, modelling, and combinations of these approaches. This theme is critical because monitoring design influences transaction costs, fairness, credibility, and administrative feasibility. The methodological note makes clear that purely results-based monitoring is not always appropriate, especially where ecological outcomes are difficult to attribute or strongly affected by external factors; in such cases, combined systems using compliance checks, indicators, remote sensing, and on-site verification may be more workable.

The sixth theme, **type of payment design**, refers to the basic payment logic of the mechanism. The categories considered include action-based schemes, results-based schemes, hybrid approaches, and collective schemes. This distinction is central to PES design because it shapes incentives, risk allocation, administrative complexity, and the relationship between payment and performance. Both the methodological note and WP3 findings indicate that hybrid approaches are often especially relevant, as they can combine the operational simplicity of action-based payments with stronger performance orientation through result-based elements. Collective schemes are also important in contexts where ecosystem processes operate at landscape scale and cannot be effectively addressed through isolated parcel-level contracts.

The seventh theme, **promotion and facilitation mechanisms**, concerns the enabling measures through which financial programmes can support uptake and implementation. The categories considered include information campaigns, advisory support, intermediary

organisations, regulatory integration, and coordination mechanisms. This theme was included because both the case-based evidence and the workshop-related material underline that PES success depends not only on payment design, but also on institutional support, communication, technical assistance, and the reduction of transaction costs. Advisory services, scoring systems, intermediary support, and integration into existing planning or programme structures are therefore not peripheral, but often decisive for practical implementation.

Derivation and relevance of the option categories

The option categories associated with each theme were not developed in isolation. They were derived from the combined evidence base assembled in WP2 and WP3, previous workshop input, partner comments, and the wider academic and policy literature on PES design and implementation. In particular, the note accompanying the scenario tables explains that, for each theme, several possible approaches were reviewed on the basis of evidence from WP2 and WP3, previous workshop input, and relevant literature, after which feasible and internally compatible options were selected for use in the scenarios.

The relevance of these categories is also supported by the project's earlier findings. WP2 Deliverable 2.2 provided evidence on the diversity of operational arrangements, design features, funding structures, and institutional set-ups across 108 PES case studies. WP2 Deliverable 2.3 further identified key barriers and enabling conditions such as bureaucracy, financial constraints, legal framework, communication, and implementation capacity. These findings helped determine which categories were sufficiently grounded in practice to serve as meaningful building blocks for preliminary options.

WP3 contributed an additional forward-looking dimension. The analysis of EU policy and financial-programmes, the Delphi study, and workshop discussions showed that PES integration in EU programmes is shaped by a gap between policy recognition and operational funding commitment, by uneven understanding of PES terminology, and by the need for stronger governance support, clear monitoring systems, and hybrid financing and payment models. The WP3 workshop and presentation materials also highlighted that scenarios are useful tools for stimulating debates about stakeholder preferences for different PES design themess, including buyer-provider relations, payment conditionality, funding sources, duration, and monitoring design. These insights helped refine the option categories so that they remain relevant not only to past experience, but also to future EU programme design.

For these reasons, the categories presented in the table should be understood as analytically grounded and practically oriented. They were selected because they capture the principal dimensions along which realistic PES options vary in the EU context and because they are sufficiently broad to accommodate different combinations in later scenario development. At the same time, they are not exhaustive, and other variants may emerge as more suitable in specific territorial, ecological, or institutional contexts.

Taken together, these seven themes provide the common structure through which the preliminary options are organised and compared in the following section.

3. Preliminary recommendations

3.1 Scenarios based preliminary options for PES integration

The preliminary recommendations developed under Task 4.1 are presented as a set of scenario-based options for the integration of Payments for Ecosystem Services (PES) and PES-related mechanisms into EU funding programmes. Each scenario combines specific options across the seven design themes introduced in the previous section and translates them into a coherent PES configuration.

The scenarios are presented as preliminary options rather than final recommendations. Their purpose is to show how different PES design elements can be combined into distinct and policy-relevant integration pathways. To ensure consistency and comparability, each scenario is presented in the same format, including a short narrative description and a summary table covering the seven design themes.

The following subsections present the seven preliminary scenarios in a consistent format, each combining a narrative explanation with a structured summary of recommended options across the seven design themes, together with the key feasibility challenge addressed, the rationale for selection, the expected beneficiaries, and the main policy, implementation, environmental, and socio-economic outcomes.

3.1.1 Scenario 1: Paying for better forest biodiversity through the common agricultural policy (CAP)

Scenario 1 was selected because it combines a high-priority environmental objective in European forests (biodiversity improvement) with the most scalable and administratively established funding route currently available across Member States: eco-schemes under Pillar I of the Common Agricultural Policy (CAP). Eco-schemes are part of the CAP direct payment architecture and are designed to support environmental and climate practices through annual payments, which makes them a particularly relevant entry point for biodiversity-oriented PES integration where benefits are diffuse and private demand is weak. The European Commission explicitly presents eco-schemes as a key instrument for rewarding environmental and climate public goods within the CAP framework. (European Commissiona; EU CAP Network, 2023; Haines-Young & Potschin, 2018; Burton & Schwarz, 2013; Copernicus Data Space Ecosystema)

Key feasibility challenge addressed by the scenario

A central challenge in biodiversity PES is that species-level outcomes are often slow to appear and can be influenced by factors beyond the control of a single forest owner, such as surrounding landscape conditions, weather variability, and ecological time lags. This makes it difficult to build a fair and scalable scheme if payments depend only on species-level results, especially in a large public programme.

For this reason, the scenario is designed around habitat conditions that forest managers can realistically influence within the contract period (for example structural habitat features), while still keeping an incentive for ecological performance. In practical terms, this reduces participation risk, improves administrative feasibility, and maintains environmental credibility. This approach is consistent with European evidence on

result-oriented agri-environment schemes, which highlights the need to balance outcome orientation with manageable monitoring requirements and acceptable risk for participants.

Recommended options

The ecosystem service focus in this scenario is framed as habitat and gene pool protection (CICES-aligned), which provides a clearer and more operational basis for programme design than broader biodiversity language alone. The Common International Classification of Ecosystem Services (CICES) provides a structured and comparable framework for defining ecosystem services for policy and accounting contexts, and includes habitat and gene pool protection within its Regulation and Maintenance classes. This framing supports PES design because it focuses on ecological conditions that are management-dependent and can be linked to contractible actions and proportionate verification. In practice, this means the scenario can target forest structural conditions that support biodiversity (e.g., habitat features, stand heterogeneity) while recognising broader ecological effects such as connectivity as important programme-level outcomes rather than strict payment triggers.

The selected **temporal framework** (5–7 years with periodic review) is based on the need to balance ecological response time, programme feasibility, and participant acceptability. Biodiversity-supporting habitat structures in forests usually do not respond meaningfully to very short contracts, while excessively long commitments can reduce flexibility and participation in voluntary schemes. Evidence from European result-oriented agri-environment and conservation payment schemes shows that scheme design must carefully manage landholder risk and transaction costs, especially where outcomes are uncertain or delayed. The chosen timeframe therefore supports ecological progress while remaining compatible with CAP programming and review cycles.

The **geographical scope** (priority biodiversity areas such as Natura 2000 sites and biodiversity hotspots, with ecological tailoring) was selected because biodiversity PES is generally more effective when payments are spatially targeted to areas with higher additionality, rather than distributed uniformly. This follows established PES design principles in the literature, where spatial targeting and payment differentiation are repeatedly identified as central to improving cost-effectiveness and ecological impact. For biodiversity in particular, the ability to target priority areas and adapt indicators to ecological context is critical to avoid deadweight and to align payments with conservation needs.

The **financial mechanism** in Scenario 1 is intentionally simple and specific: EU public funding only through CAP Pillar I eco-schemes. This is justified by both policy logic and service characteristics. Biodiversity outcomes in forests are public goods, meaning the benefits accrue broadly to society rather than to a clearly identifiable private buyer. In such contexts, publicly funded PES is often the most realistic and scalable approach. The CAP eco-scheme structure is especially relevant because it already exists, has wide administrative reach across Member States, and is explicitly oriented toward environmental and climate objectives.

The **implementation control system** is designed as a proportionate hybrid verification system combining habitat-related indicators, remote sensing, on-site verification, and administrative checks. This reflects a practical trade-off recognised in the literature: biodiversity outcomes are important, but strict species-level results-based payment

systems can become costly, uncertain, and difficult to scale. Reviews of result-oriented schemes in Europe show that outcome-oriented designs can be valuable, but they require careful calibration of indicators, risk-sharing, and monitoring burden. In this scenario, the use of structural habitat indicators and remote sensing (including Sentinel-2/Copernicus land-monitoring capacity) provides a more scalable and policy-compatible control system than relying exclusively on intensive species surveys.

The **Payment design** is a hybrid PES design (action-based base payment plus results-based ecological bonus). This choice is grounded in both practical and scholarly experience. Purely action-based schemes can be easier to administer but may have weak environmental credibility if outcomes are not considered; purely results-based schemes can improve outcome orientation but often increase uncertainty and risk for participants. A hybrid structure is therefore a defensible choice for biodiversity-focused forest PES in a CAP context because it supports uptake through predictable action-based payments while retaining an incentive for ecological quality improvements.

The **promotion and facilitation mechanisms** in this scenario are embedded in programme design rather than treated as stand-alone outreach tools. This includes EU-level guidance, Member State implementation tools, advisory support, and optional collective participation arrangements. This is consistent with broader evidence from PES and agri-environment implementation: institutional capacity, clarity of rules, and intermediary support are often as important as payment size for uptake and scheme performance. In a CAP setting, where administrative systems already exist but vary across Member States, these facilitation elements help improve consistency and usability without requiring a new instrument.

Taken together, the recommended options form a coherent and feasible PES configuration for biodiversity within an existing EU financial programme: a public-good service focus, a public funding anchor, medium-term voluntary commitments, targeted geography, proportionate MRV, a hybrid payment logic, and programme-embedded facilitation. The value of this scenario lies not only in the ecological outcomes it seeks, but in its potential to demonstrate how forest biodiversity PES can be operationalised at scale within current CAP structures.

Interpretation note (optional but useful)

This scenario is designed to improve habitat conditions and biodiversity-supporting forest structure at scale within CAP-compatible PES arrangements. It should therefore be interpreted as a mechanism for strengthening biodiversity management and ecological conditions, rather than as a guarantee of short-term species recovery in all contexts.

Table 2. Recommended options of scenario 1 (Paying for better forest biodiversity through the Common Agricultural Policy (CAP))

Theme	Recommended Option for S1
1. Forest ecosystem services targeted	Biodiversity: Maintaining and enhancing habitats and gene pool protection *(CICES: Regulation & Maintenance → Lifecycle maintenance, habitat and gene pool protection)*

2. Temporal framework	Medium-term commitments (5–7 years) aligned with CAP programming cycles, with periodic review and adjustment of compliance and ecological progress (e.g. every 1–2 years)
3. Geographical scope	Designated conservation areas and priority biodiversity zones (e.g. Natura 2000 sites and nationally mapped biodiversity hotspots) with management requirements tailored to regional ecological conditions.
4. Financial mechanism	Public: EU public funding only for CAP strategic plan interventions (e.g. eco-schemes under Pillar I), providing annual or multi-annual payments for biodiversity-enhancing forest management practices.
5. Implementation Control Systems	Habitat-quality indicators (deadwood volume, age structure, habitat features (tree cavities, microhabitats), structural diversity index), measured through remote sensing (canopy cover patterns, gaps/structural complexity proxies, disturbance history) and on-site verification (deadwood volume, set-aside habitat trees, followed by management restrictions) and administrative checks using CAP monitoring systems
6. Payment design	Hybrid: action-based funding + result-based ecological performance bonus, implemented through CAP Eco-scheme instrument
7. Promotion and Facilitation Mechanisms within financial programme	Integration into CAP Strategic Plans, supported by European Commission policy guidance combined with Member State implementation tools (e.g., scoring systems, administrative procedures), advisory services, intermediary support, and collective/coordinated participation options, to ensure coherent delivery.

Why this scenario?

Scenario 1 was selected because it addresses a core and urgent policy challenge in European forests: biodiversity decline, while using the most scalable and administratively established EU funding route currently available across the European Union: CAP Pillar I eco-schemes.
Biodiversity in forests is a classic public good, with broad societal benefits but weak private market demand, making publicly financed PES the most realistic large-scale solution. By embedding habitat-focused payments within the existing CAP architecture, this scenario combines ecological priority with institutional feasibility, avoiding the need for a new instrument while ensuring EU-wide reach. It reflects both project evidence (D2.2/D2.3) and European practice, which show that action-based or hybrid biodiversity schemes are more operationally viable at scale than purely results-based approaches. In short, Scenario 1 represents the most policy-compatible and potentially scalable pathway where legal eligibility and national design permit for integrating forest biodiversity PES into existing EU funding structures.

Who benefits?

- **Forest owners / land managers**: predictable payments for biodiversity-friendly forest management, with manageable entry conditions

- **Member States / managing authorities**: progress toward biodiversity targets using existing Common Agricultural Policy mechanisms
- **Environmental authorities**: measurable habitat improvements using accepted indicators
- **Citizen/Society**: more resilient, diverse forests and associated ecosystem co-benefits

Expected outcomes

- **Policy outcomes:** measurable improvement in habitat-condition indicators in targeted priority areas; increased uptake of biodiversity-relevant practices within CAP Strategic Plans; improved coherence and comparability of biodiversity delivery across participating regions.
- **Implementation outcomes:** functioning hybrid payment model at scale (action core + performance bonus) with feasible monitoring (remote sensing + checks), demonstrating an operational PES logic within CAP.
- **Environmental outcomes:** increased deadwood retention, habitat trees, structural diversity and stand heterogeneity; strengthened ecological condition and resilience over time in priority zones.
- **Socio-economic outcomes:** improved acceptance of biodiversity-oriented payments among forest owners via predictable support and clear compliance rules.

3.1.2 Scenario 2: Protecting water resources through watershed-scale PES

Scenario 2 was selected to represent a watershed-scale PES model in which forest management is used to support water quality and hydrological regulation across priority basins through a public-policy framework, with possible co-financing from downstream beneficiaries (including utilities). This scenario is important because it captures a governance and financing logic that differs from source-specific utility-led PES (Scenario 7): it is designed for basin-scale public objectives such as sediment reduction, nutrient retention, and flow regulation, rather than only protection of a single drinking-water abstraction system. This is also consistent with the European Union Water Framework Directive (WFD), which is built around River Basin Management Plans and Programmes of Measures as the core implementation architecture for protecting and restoring water bodies (European Commissionb&c&d;Goldman-Benner et al., 2012,Bennett et al., 2014; de Lima et al., 2017; Feng et al., 2018; Haines-Young & Potschin, 2018)

Key feasibility challenge addressed by the scenario

A central challenge in watershed PES is that water-quality and hydrological outcomes are often influenced by weather variability, time lags, and upstream activities outside the scheme, which makes it difficult to attribute observed changes directly to individual contracts. In practice, this makes strict results-only payment systems hard to apply fairly and robustly at basin scale.

For this reason, the scenario is designed around a hydrologically targeted, long-term, action-based/hybrid approach, supported by monitoring and modelling rather than relying only on downstream outcome metrics as payment triggers. This is consistent with the watershed PES literature, which emphasises uncertainty, attribution limits, and the importance of combining monitoring, modelling, and adaptive design rather than assuming simple linear cause–effect relationships in real catchments.

Recommended options

The ecosystem service focus is framed as watershed protection services (water quality regulation and hydrological regulation), which is both scientifically and policy-appropriate for forest-based water PES. In CICES terms, this aligns with Regulation and Maintenance services including water purification, control of erosion rates, and hydrological flow regulation. Using “watershed protection” as the framing is preferable to generic “water services” because the mechanism concerns land-use management in the watershed that affects downstream outcomes (e.g., sediment loads, nutrient retention, runoff moderation), rather than the allocation of water rights themselves. The term is also widely used in the international PES literature (e.g., payments for watershed services / water funds).

The selected service bundle (sediment reduction, nutrient retention, peak-flow attenuation, and stabilisation of dry-season flows) is well suited to forest-based watershed PES because these outcomes are strongly linked to catchment condition, vegetation cover, soil protection, and infiltration processes. These are also the types of outcomes that public authorities and downstream water users can justify financially, as they relate to WFD implementation, flood-risk reduction, and lower downstream treatment or sedimentation costs. The WFD’s river-basin logic and Programmes of Measures framework make this a particularly relevant policy context for a watershed-scale PES design.

The **temporal framework** (10–20 years with periodic review) was selected because watershed responses to land-management change are often gradual, and because basin planning and water-related infrastructure decisions operate on medium- to long-term cycles. Short project-based contracts are often too limited to support measurable changes in sediment dynamics, nutrient retention, or flow regulation, especially where forest restoration or management transitions are involved. A longer contract horizon, combined with periodic review, is therefore a better fit for both hydrological processes and public-programme planning.

The **geographical scope** (high-risk river basins or sub-basins, including transboundary catchments where relevant) was selected because watershed PES is most effective when spatial targeting follows hydrological boundaries rather than administrative ones. This is directly aligned with the WFD’s river basin district approach and supports stronger ecological and programme additionality by focusing contracts in upstream areas where forest management can materially influence downstream risks and compliance outcomes. In transboundary basins, coordinated targeting may be particularly important because upstream–downstream dependencies often cross administrative borders.

The **financial mechanism** in Scenario 2 is a public–private mix with a public (state-aid type) baseline and utility co-financing, rather than a purely public or purely private arrangement. This is a strong fit for watershed-scale PES because the benefits are mixed: some are public (e.g., river basin objectives, flood regulation, ecosystem condition), while others create more direct value for downstream users (e.g., water treatment cost reduction, sediment risk reduction). Evidence from water funds and watershed PES practice shows that schemes tend to be more durable when institutions with stable revenue streams (including utilities and public agencies) are involved as payers, while public frameworks remain important for coordination and legitimacy.

The **implementation control system** is deliberately designed as a proportionate combination of compliance monitoring, water-quality/hydrological indicators, remote

sensing, and modelling, rather than as a strict results-only MRV system. This is a scientifically defensible choice in watershed contexts, where downstream indicators (e.g., turbidity, nutrient levels, flow variability) are relevant and useful, but cannot always be interpreted as direct evidence of the effect of one contract or one land manager. The literature on watershed PES and PES uncertainty highlights exactly this problem and supports more explicit treatment of uncertainty, modelling, and adaptive interpretation of monitoring data.

The **payment design** is best understood as a hybrid PES with an action-based core and outcome-based components informed by monitoring and modelling. This structure is appropriate because pure results-based watershed contracts can place too much uncontrollable risk on participants and become difficult to administer in hydrologically noisy systems, while purely action-based schemes may weaken environmental credibility if outcomes are not considered at all. A hybrid structure allows payments for agreed upstream management practices while still linking part of the scheme logic to observed basin-level signals where these can be interpreted credibly. This is consistent with broader PES design guidance for forest ecosystem services, which emphasises clear conditionality while recognising the need to adapt scheme design to service characteristics and monitoring feasibility.

The **promotion and facilitation mechanisms** in this scenario are embedded in programme and basin governance design rather than treated as generic communication tools. This includes programme provisions that enable nature-based watershed protection contracts, support for coordination among upstream land managers, facilitation between payers and providers (including utilities), and guidance for integrating PES into basin planning frameworks. This is an important part of feasibility because watershed PES often fails not from lack of ecological rationale, but from high transaction costs, fragmented institutions, and weak coordination across the basin.

Taken together, the recommended options form a coherent and feasible PES configuration for watershed-scale water regulation within a public-policy framework: a hydrologically meaningful service focus, long-term but reviewable contracts, river-basin targeting, a public–private funding mix with stable payer logic, proportionate monitoring supported by modelling, and a hybrid payment structure with an action-based core. The value of this scenario lies not only in the water-related outcomes it seeks, but in its potential to demonstrate how watershed-scale PES can be incorporated into regional/public funding programmes in a way that is hydrologically credible, administratively workable, and compatible with downstream beneficiary co-financing.

Interpretation note

This scenario is designed as a watershed-scale, hydrologically informed PES model for improving upstream land management and downstream water-related functions over time. It should therefore be interpreted as a mechanism for strengthening basin-level prevention and regulation outcomes, rather than as a strict results-only contract guaranteeing short-term changes in all monitored water-quality indicators.

Table 3. Recommended options of scenario 2 (Paying for watershed protection through basin-scale forest management)

Theme	Recommended Option

1. Forest ecosystem services targeted	Regulation of water quality and flow through forest management (*CICES: Regulation & Maintenance → Hydrological cycle regulation and water purification)*
2. Temporal framework	Long-term contracts (10–20 years) aligned with river basin management planning cycles under the Water Framework Directive (WFD)
3. Geographical scope	Upstream forest areas within high-risk river basins with sediment, nutrient, or flow-regulation pressures (including, but not limited to, drinking-water relevance), including transboundary catchments where coordination is needed.
4. Financial mechanism	Public-private: National or regional State aid schemes + Co-financing from water utilities through regulated tariffs or water charges
5. Implementation Control Systems	Water quality measurements (e.g. turbidity, nutrient concentrations) + Hydrological indicators (e.g. flow variability, retention effects) + Monitoring at water abstraction points or downstream control stations + Model-supported interpretation of upstream management effects
6. Payment design	Hybrid: Action-based payments for agreed management practices + result-based bonus/component informed by monitoring and modelling.
7. Promotion and Facilitation Mechanisms within financial programme	Incorporation into regional and cohesion funding programmes through: Priority axes for nature-based water protection measures + Incentives for participation of upstream land managers + Facilitation of partnerships between utilities and landowners

Why this scenario?

Scenario 2 was selected because it addresses a structurally important but hydrologically complex policy challenge in European forest and water governance: improving water quality and flow regulation at the watershed scale through upstream forest management. Unlike source-specific utility models, this scenario reflects a basin-wide public-good logic aligned with river basin governance frameworks, where sediment control, nutrient retention, and flood-risk mitigation are collective regional objectives. Because these benefits accrue across larger hydrological systems and to multiple downstream users and public authorities, the scenario captures a broader governance pathway in which watershed protection is embedded in basin planning and coordination, while still allowing complementary co-financing from downstream actors where relevant. This is also consistent with European experience, where watershed-related PES mechanisms are among the most mature and durable PES configurations, particularly when linked to river basin planning frameworks and supported by actors with stable revenue streams. In short, Scenario 2 was chosen because it provides a credible and policy-compatible model for basin-scale forest PES that is distinct from utility-led source protection and well aligned with existing water management frameworks.

Who benefits?

- **Forest owners/land managers:** long-term payments for watershed protection measures
- **Regional and basin authorities**: improved water regulation, sediment control, and flood-risk mitigation

- **Water users / downstream communities**: improved water quality and reduced flood-related risks
- **Public programmes/infrastructure operators**: lower long-term costs from erosion, sedimentation, and hydrological instability

Expected outcomes

- **Policy outcomes:** basin-level progress on WFD pressures (sediment, nutrients, hydromorphological stress) through targeted upstream interventions; stronger integration of PES-style contracts into basin planning instruments.
- **Implementation outcomes:** workable hybrid design that uses monitoring and modelling to interpret "noisy" water indicators; improved coordination among multiple land managers and payers.
- **Environmental outcomes:** reduced erosion risk, improved infiltration and buffer function, reduced peak runoff in treated sub-basins, improved long-term trends in key water-quality indicators (interpreted over multi-year windows).
- **Socio-economic outcomes:** reduced long-term treatment/sedimentation costs where prevention is effective; increased resilience of water services under climate variability.

3.1.3 Scenario 3: Paying for verified forest carbon removals

Scenario 3 was selected because it represents the most direct pathway for integrating forest-based PES into the European Union's climate policy and finance architecture through certified carbon removals, where there is both a clear policy need (increasing durable removals in the land sector) and a plausible mix of public and private funding sources. The EU's land-use sector policy framework explicitly recognises the role of afforestation, protection of existing carbon stocks, and land management in increasing removals, while also emphasising improved transparency and advanced monitoring for land-sector accounting. At the same time, the EU has established the Carbon Removals and Carbon Farming Regulation (CRCF, Regulation (EU) 2024/3012) as the first EU-wide voluntary certification framework for carbon removals, carbon farming and carbon storage in products, with third-party verification and an EU registry architecture to support trust and investment. (European Commissione&f&g.; Gren, 2016; Grafton et al., 2021; Leifeld, 2025; Löfqvist et al., 2023)

Key feasibility challenge addressed by the scenario

A central challenge in forest carbon PES is that the projects most relevant for long-term removals (such as afforestation and peatland rewetting) often require substantial upfront investment, while carbon benefits are realised and verified over long time periods. At the same time, forest carbon schemes face well-known design challenges related to additionality, permanence, uncertainty, and transaction costs.

For this reason, the scenario is designed as a high-integrity hybrid carbon PES model: it combines certification-based accounting and verification with a payment structure that can include upfront or milestone support for establishment/restoration costs and results-based payments linked to verified removals over time. This approach is consistent with the practical observation that carbon sequestration and rewetting projects often use ex-ante payments and buffer arrangements to manage uncertainty and non-permanence risk, rather than waiting until the very end of a long contract period to pay land managers.

Recommended options

The ecosystem service focus in this scenario is climate regulation through long-term carbon sequestration and storage (CICES-aligned). This is a strong basis for PES design because it keeps the contractual focus on the ecosystem service outcome (carbon removal/storage) while allowing multiple management pathways to deliver that service (for example afforestation/reforestation, improved forest management, and peatland rewetting/restoration). The EU land-use sector framework explicitly identifies afforestation, protection of carbon stocks, and sustainable land management as important levers for climate mitigation in the land sector, while also linking these measures to broader environmental protection goals.

The **temporal framework** (20–50-year permanence commitments with periodic verification) was selected because carbon removals only contribute credibly to climate policy if storage is durable and non-permanence risks are managed over time. This reflects a core principle in forest carbon policy design: permanence and reversal risks (e.g., fire, pests, disease, management change) are fundamental and require explicit treatment through contract length, monitoring, and risk management mechanisms. Reviews of forest carbon policy design and carbon offset systems repeatedly highlight permanence and additionality as central design challenges, and note that buffer credits or comparable mechanisms are commonly used to manage reversal risk.

The **geographical scope** (European Union-wide, with region-specific mitigation practices) was selected because carbon removals are climate-relevant across the EU, but delivery pathways and risks differ substantially by ecological conditions, land-use history, and management systems. The EU land-use sector framework itself reflects this need for regionally differentiated implementation while maintaining common monitoring and reporting requirements. The scenario therefore combines EU-wide applicability with ecological tailoring, rather than assuming a single forest carbon model is suitable everywhere.

The **financial mechanism** is a public–private mix (EU public funding + compliance/market demand + risk reserves). This is a coherent design because forest carbon removals face both financing gaps and credibility requirements. On the public side, the Innovation Fund provides a relevant EU climate-finance anchor: the Commission explicitly states that ETS revenues are reinvested into the Innovation Fund, one of the EU's largest funding programmes for innovative low-carbon technologies. On the demand side, the scenario assumes financing from regulated emitters and other obligated/private buyers purchasing certified removals within applicable policy and market rules, rather than relying only on informal voluntary demand. This is consistent with the broader policy trend toward stronger regulation, certification and transparency in carbon removals.

Importantly, the scenario also includes **dedicated risk buffer reserves** (or equivalent risk-pooling mechanisms) as part of the financial architecture. This is not simply an accounting detail: permanence risk is a core financial and credibility issue in forest carbon systems, and the literature and policy practice consistently point to buffers/insurance-like approaches as necessary safeguards.

The **implementation control system** is built around CRCF-aligned carbon accounting and verification, supported by remote sensing, ground data, and long-term monitoring. This is a key strength of the scenario because it links PES design to an emerging EU

certification framework that explicitly aims to build trust, prevent greenwashing, and standardise monitoring/reporting rules. The CRCF framework establishes EU quality criteria and monitoring/reporting processes, and the Commission's implementation pathway includes third-party verification, regular audits, and registry-based publication of certification information.

This control-system design is also consistent with broader EU land-sector governance, which emphasises transparency, advanced monitoring technologies (including satellite-based data), and alignment with land-use accounting and reporting systems under the LULUCF framework. By combining certification-based accounting, biomass estimation, remote sensing, and risk management, the scenario supports both programme credibility and long-term operability.

The programme type is a hybrid carbon PES scheme combining:

- upfront or milestone-based payments (to cover establishment and restoration costs), and
- results-based payments linked to verified tonnes of carbon dioxide removed and stored.

This hybrid structure is particularly important for feasibility. Purely results-only payment systems can be attractive in principle, but in practice they can exclude land managers who cannot finance planting, restoration, or hydrological works upfront. The peatland carbon literature explicitly notes that project payments in rewetting or sequestration projects are often realised ex-ante and that uncertainty is managed through buffers and portfolio/risk approaches. The hybrid design therefore preserves carbon conditionality while reducing entry barriers and financing risk.

The **promotion and facilitation mechanisms** in this scenario are embedded in programme and market infrastructure rather than treated as generic awareness-raising. This includes recognised certification methodologies under the CRCF, registry systems, technical guidance, and financial instruments that support upfront investment (e.g., loans/guarantees or project development assistance mechanisms). This design choice reflects a common finding in restoration and carbon-finance literature: financing barriers are not only about willingness to pay, but also about project development costs, risk allocation, and the lack of investable project structures without public support and enabling institutions.

Taken together, the recommended options form a coherent and feasible PES configuration for forest carbon removals within a European climate-policy context: a climate-regulation service focus, long-duration permanence commitments, EU-wide applicability with regional tailoring, a public–private financing mix with risk buffers, certification-based MRV, and a hybrid payment structure that addresses upfront costs while retaining results-based integrity. The value of this scenario lies not only in the carbon outcomes it seeks, but in its potential to demonstrate how high-integrity forest carbon PES can be incorporated into EU climate finance and certification systems without relying on weak or purely voluntary market claims.

Interpretation note

This scenario is designed as a certification-based, high-integrity forest carbon PES model that combines financing feasibility with long-term climate credibility. It should therefore be interpreted as a mechanism for scaling verified removals under robust accounting and risk-management conditions, rather than as a low-cost or rapid-deployment solution for all forest carbon contexts.

Table 4. Recommended options of scenario 3 (Paying for verified forest carbon removals)

Theme	Recommended Option
1. Forest ecosystem services targeted	Climate regulation through long-term carbon sequestration and storage *(CICES: Regulation & Maintenance → Global climate regulation by reduction of greenhouse gas concentrations)*
2. Temporal framework	Long-term permanence commitments (20–50 years) with periodic verification of carbon storage and risk management over time
3. Geographical scope	European Union-wide application, with region-specific mitigation practices reflecting ecological conditions and land-use suitability
4. Financial mechanism	Public+private: European Union climate instrument (Innovation Fund) + compliance/market demand from emissions trading system actors purchasing certified removals (compliance or regulated buyers include operators of energy-intensive digital-asset activities) + risk buffer reserve for non-permanence (e.g., pooled buffer credits).
5. Implementation Control Systems	Carbon accounting and verification aligned with the Carbon Removal Certification Framework, including: Standardised carbon accounting consistent with land-use reporting systems + Biomass estimation using remote sensing and ground data + Risk management mechanisms (e.g. buffer pools for reversals)
6. Payment design	Hybrid: Upfront or milestone-based payments to cover establishment and restoration costs + Results-based payments linked to verified tonnes of carbon dioxide removed and stored
7. Promotion and Facilitation Mechanisms within financial programme	Promotion through carbon-related funding instruments by: Recognition of certified carbon removals (CRCF) as eligible climate investments + Financial instruments facilitating upfront investment (e.g. loans or guarantees from European investment institutions) + Guidance for participation of regulated emitters and voluntary buyers

Why this scenario?

Scenario 3 was selected because it addresses a central and strategically sensitive policy challenge in European climate governance: how to scale forest-based carbon removals in a way that is credible, additional, and durable. As the European Union moves toward climate neutrality, increasing removals in the land sector has become a clear policy

objective, yet forest carbon schemes face persistent concerns regarding baselines, additionality, permanence, and monitoring integrity. In the European context—where forest area and carbon stocks have already been increasing in many regions—establishing credible baselines beyond expected business-as-usual trends is particularly critical. For this reason, the scenario is anchored in a certification-based, policy-aligned framework rather than relying on loosely regulated voluntary market expansion. This scenario also reflects project evidence (D2.2/D2.3) showing that carbon-focused PES mechanisms are expanding but continue to struggle with trust, risk allocation, and long-term credibility. By prioritising robust monitoring, permanence safeguards, and risk-buffer mechanisms, the design responds directly to these integrity challenges while allowing a structured mix of public and private financing. In short, Scenario 3 was chosen because it provides a high-integrity, policy-compatible pathway for integrating forest carbon PES into emerging European certification and climate-accounting frameworks, without compromising environmental credibility for the sake of rapid market growth.

Who benefits?

- **Forest owners/land managers**: long-term income from verified carbon removals and storage
- **Private buyers / regulated emitters**: access to certified, high-integrity carbon removals
- **European Union and Member State climate policy**: additional removals aligned with climate targets and accounting systems
- **Citizen/society**: lower net greenhouse gas emissions and more climate-resilient landscapes

Expected outcomes

- **Policy outcomes:** increased deployment of certified removal activities consistent with emerging EU certification requirements; improved integrity/credibility of forest carbon claims through baseline-setting, verification, and permanence safeguards.
- **Implementation outcomes:** demonstration of a financing structure that overcomes long timelines (upfront/milestone + results-based payments) and manages reversal risk (buffers/risk pooling).
- **Environmental outcomes:** verified net carbon storage improvements beyond business-as-usual baselines (where robustly defined), plus resilience-oriented practices that reduce reversal risk.
- **Socio-economic outcomes:** strengthened trust and transparency through registries, third-party verification, and standardised methodologies.

3.1.4. Scenario 4 : Paying for climate resilience and fire risk reduction

Scenario 4 was selected because it addresses a rapidly growing European policy challenge: wildfire risk reduction through preventive forest and landscape management, especially in high-hazard areas and wildland–urban interface (WUI) zones. The European Commission and related EU institutions increasingly frame wildfire policy not only as emergency response, but also as prevention, preparedness and resilience-building, including links to the EU Forest Strategy and the EU Adaptation Strategy. The Commission's forest fire policy page explicitly highlights prevention and climate resilience, and points to vegetation/fuel management as part of wildfire prevention guidance (European Commissionh&i; European Environment Agency, 2025; Ott et al., 2023; Joint Research Centre, 2018; CINEAa; European Union, 2022a; European Union, 2022b).

Key feasibility challenge addressed by the scenario

A central challenge in wildfire-related PES is that the most important public objective is usually reducing fire-spread potential and damage risk, not preventing every ignition or every fire event. Ignitions and fire occurrence are strongly affected by weather, human activity, and broader landscape conditions, which means a strict results-only payment model based on “fires avoided” would be difficult to apply fairly and credibly.

For this reason, the scenario is designed around verifiable preventive management actions and risk-reduction indicators (e.g., fuel structure and continuity, strategic treatment areas, maintenance of fuel breaks/mosaics), combined with performance bonuses linked to reduced fire-spread risk rather than fire occurrence. This is consistent with wildfire risk-management literature showing that fuel treatments are primarily used to reduce spread, intensity, or severity and to improve suppression conditions, while outcomes still depend on context and weather.

Recommended options

The ecosystem service focus in this scenario is framed as regulation of disturbance impacts through reduced wildfire spread potential (CICES-aligned under Regulation and Maintenance services related to mediation of mass flows / extreme events). This is a more robust basis for PES design than using “fire occurrence” as the service outcome, because forest and landscape management can directly influence fuel load, fuel continuity, and vegetation structure, which are key determinants of fire behaviour and spread. Evidence from wildfire management literature and synthesis work on fuel treatments supports this focus on spread, intensity, and severity reduction as the relevant management objective.

The **temporal framework** (5–10 years with periodic review) was selected because preventive wildfire-risk management requires repeated interventions and maintenance over time, but also needs flexibility to adjust to changing vegetation conditions, hazard patterns, and local management constraints. Medium-term contracts are long enough to support sustained preventive action (e.g., fuel management, structural diversification, maintenance of strategic areas), while periodic review allows authorities to reassess compliance and risk conditions without redesigning the whole programme. This aligns with the broader EU policy shift toward integrated wildfire risk management and prevention-oriented approaches rather than one-off actions.

The **geographical scope** (high-hazard regions, especially wildland–urban interface areas and hazard-class zones) was selected because wildfire risk and public exposure are highly uneven across Europe. EU and EEA materials highlight that WUI areas are particularly important because they increase both ignition likelihood and the social/economic consequences of fires. The EEA also notes the growing importance of WUI expansion and the limits of suppression-focused approaches in increasingly fire-prone landscapes. This makes risk-based spatial targeting essential for cost-effective PES design, rather than uniform deployment across all forest areas.

The **financial mechanism** in Scenario 4 is intentionally centred on public funding only (State-aid-compatible national/regional support), with optional EU co-financing (e.g., LIFE Programme climate adaptation support). This is a strong fit for the service type because wildfire prevention generates large public benefits (reduced losses to communities, infrastructure, and ecosystems), while there is usually no single private buyer with

sufficient and stable willingness to pay for landscape-scale preventive management. The LIFE Programme is the EU's funding instrument for environment and climate action and includes climate adaptation support, which makes it a relevant complementary source for piloting, demonstration, or co-financing preventive measures. State-aid-compatible public support routes are also relevant in forestry and environmental measures, providing a policy-compatible pathway for national or regional schemes.

The **implementation control system** is designed as a proportionate combination of:

- verification of agreed preventive management actions,
- risk-relevant structural indicators (e.g., fuel continuity/fuel load proxies, vegetation structure conditions),
- remote sensing for land cover and vegetation change,
- on-site verification,
- and use of wildfire risk assessment tools where available (including alignment with hazard/risk information systems).

This is a stronger design than a pure event-based control system because wildfire events are stochastic and strongly weather-driven. EU systems such as EFFIS (within Copernicus) and JRC/EFFIS wildfire risk assessment work provide an institutional basis for harmonised risk information, danger mapping, and wildfire monitoring that can support programme targeting and accountability, while local on-site verification remains essential for checking contracted measures.

The **payment design** is an action-based PES scheme with risk-reduction performance bonuses. This structure is appropriate because it preserves a clear and fair payment basis (implementation and maintenance of preventive measures), while still rewarding better performance where risk-reduction indicators can be assessed credibly. A strict results-only model linked to fire occurrence or burned area would be unreliable and potentially unfair, as major outcomes are strongly affected by exogenous conditions. By contrast, an action-based model with risk-reduction bonuses fits both wildfire science and public-programme feasibility.

The **promotion and facilitation mechanisms** are embedded in programme design and risk governance, rather than treated as generic awareness activities. This includes dedicated programme windows for preventive management, incentives for coordinated participation in priority landscapes, technical guidance, and support for collective or coordinated applications where landscape continuity matters. This is important because wildfire prevention often requires spatial coordination, but not all contexts are suitable for mandatory collective arrangements. A programme design that supports coordination without imposing a one-size-fits-all governance model is therefore more feasible and more consistent with voluntary PES participation.

Taken together, the recommended options form a coherent and feasible PES configuration for wildfire risk reduction within a public climate-adaptation and prevention policy context: a risk-reduction ecosystem service focus, medium-term and reviewable contracts, hazard-based spatial targeting, a public funding anchor with optional EU adaptation co-financing, proportionate verification using risk-relevant indicators and remote sensing, and an action-based payment structure with risk-reduction bonuses. The value of this scenario lies not only in the fire-risk outcomes it seeks, but in its potential to demonstrate how preventive forest management can be financed through PES-compatible public

programmes in a way that is scientifically grounded, administratively workable, and aligned with EU resilience policy.

Interpretation note

This scenario is designed as a prevention-oriented PES model for reducing wildfire spread potential and strengthening landscape resilience over time. It should therefore be interpreted as a mechanism for improving preventive management and risk conditions, rather than as a contract guaranteeing fewer ignitions or the absence of large fires in every season.

Table 5. Recommended options of scenario 4 (Paying for climate resilience and forest wildfire risk reduction)

Theme	Recommended Option
1. Forest ecosystem services targeted	Regulation of disturbance impacts through reduction of wildfire spread potential *(CICES: Regulation & Maintenance → Mediation of extreme events)*
2. Temporal framework	Medium-term commitments (5–10 years), with periodic review of compliance and landscape risk conditions
3. Geographical scope	Regions with high wildfire hazard, particularly wildland–urban interface (WUI) zones and areas identified through national fire risk assessments
4. Financial mechanism	Public (state aid): National or regional public programmes for risk prevention and climate adaptation, potentially complemented by EU co-financing instruments (e.g. Pillar II measures + LIFE adaptation grants)
5. Implementation Control Systems	Verification based on implementation of strategic preventive measures and landscape conditions, including: Assessment of fuel reduction in priority locations (e.g. firebreak zones, buffers near settlements, high-risk spread pathways) + Verification of compliance with approved fuel management plans + Remote sensing to monitor vegetation density and land-cover changes + Confirmation of timing of interventions relative to fire season + On-site verification of implemented measures + Use of fire risk assessment tools (e.g. waldbrand.at) where available
6. Payment design	Action-based, with risk-reduction performance bonuses, rewarding implementation and maintenance of preventive measures that reduce fire spread potential rather than fire occurrence
7. Promotion and Facilitation Mechanisms within financial programme	Incorporation into public funding schemes through: dedicated funding windows for preventive landscape management + incentives for coordinated participation across neighbouring land managers + support for collective applications where landscape-scale action is required + alignment with national wildfire risk management strategies

Why this scenario?

Scenario 4 was selected because wildfire risk has become an increasingly urgent and structural climate-adaptation challenge in European forest landscapes, particularly in high-hazard regions and wildland–urban interface zones.

Wildfire risk reduction is fundamentally a public-good function: benefits such as reduced damage to communities and infrastructure, lower suppression and recovery costs, and improved landscape resilience are widely shared, while private incentives for preventive management are often insufficient. This makes a publicly financed PES approach a realistic and policy-relevant option for scaling preventive action. By design, the scenario focuses on verifiable risk-reduction conditions (fuel structure, continuity, and maintained preventive measures) rather than event-based outcomes such as "fires avoided," which are strongly influenced by weather and external factors beyond the control of individual land managers. In short, Scenario 4 represents a policy-compatible pathway for financing prevention-oriented, climate-resilience forest management through a realistic payment and monitoring logic that preserves fairness and public accountability.

Who benefits?

- **Forest owners/land managers**: support for preventive forest management that is costly but publicly beneficial
- **Local communities (especially in high-risk areas)**: reduced wildfire spread risk and lower exposure to damage
- **Public authorities / civil protection systems**: lower long-term suppression and recovery costs
- **Infrastructure operators and local economies**: reduced disruption and damage risk in fire-prone regions

Expected outcomes

- **Policy outcomes:** measurable reduction in hazard indicators in targeted zones; improved alignment of forest management incentives with EU resilience/prevention framing.
- **Implementation outcomes:** workable scheme that avoids unfair "fire outcome" conditionality by paying for verifiable risk-reduction actions and condition-based bonuses (not "no-fire" results).
- **Environmental outcomes:** reduced fuel continuity and hazardous biomass accumulation; more fire-resilient landscape structures and strategic treated areas maintained over time.
- **Socio-economic** outcomes: reduced long-term public costs from extreme fire events (suppression, recovery, infrastructure losses) where prevention is sustained and well targeted.

3.1.5. Scenario 5 : Paying for urban cooling and well-being through urban and peri-urban forest PES

Scenario 5 was selected because it addresses a rapidly growing European policy priority: urban heat exposure and unequal access to high-quality green space, with direct implications for climate adaptation, health and social equity. This scenario captures a distinct PES integration pathway in the overall set because it links forest and green infrastructure management to urban climate and well-being objectives, rather than to biodiversity conservation, watershed protection, carbon removals or wildfire prevention.

EU urban and adaptation policy frameworks already support this direction: the European Commission's urban adaptation policy context highlights the integration of green infrastructure and nature-based solutions into urban planning, and points to Urban Greening Plans, technical guidance and funding support for cities ((European Commissionj&k&l; European Environment Agency, 2022; World Health Organization Regional Office for Europe, 2016, 2017; Yin et al., 2024: Li et al., 2024; Fry et al., 2025; Maison et al., 2024)

Key feasibility challenge addressed by the scenario

A central challenge in urban ecosystem-service PES is that some desired outcomes (especially city-wide air-quality improvement and broader health indicators) are influenced by many factors beyond the specific green-space intervention, making strict attribution to one contract or one peri-urban management action difficult. At the same time, cities often face a practical financing gap: capital investment for new green infrastructure may be available, but long-term management and maintenance funding is often weaker.

For this reason, the scenario is designed around locally attributable and management-relevant outcomes (especially cooling, canopy condition and accessibility/use), combined with action-based maintenance contracts, while treating air-quality effects as an important but context-dependent co-benefit. This is consistent with the urban climate and air-quality literature, which shows strong cooling benefits from urban trees/green infrastructure but also substantial variation by scale, canopy structure, urban form and local context, and with evidence that air-pollution effects can be mixed and highly local (including street-canyon effects and species-dependent emissions).

Recommended options

The ecosystem service focus in this scenario is framed as local climate regulation with co-benefit physical and psychological well-being enabled by urban green infrastructure (CICES-aligned: Regulation & Maintenance for local climate regulation, and Cultural services for physical/experiential interactions with the environment). This framing is stronger than a generic "urban environmental benefits" formulation because it distinguishes clearly between the primary service logic (cooling / thermal comfort and accessible green-space use) and other benefits that may be important but harder to use as payment triggers at city scale. The European Commission's green infrastructure framing and the EEA/WHO evidence base both support this multifunctional logic, including climate adaptation, health and well-being benefits from well-designed urban green space.

The selected service emphasis (cooling, access and well-being, with air quality treated more cautiously) is also scientifically justified. Reviews of urban tree canopy cooling consistently find substantial cooling effects but strong dependence on canopy characteristics, spatial arrangement, background climate and urban morphology, which reinforces the need for local targeting and site-specific design. By contrast, recent urban air-quality studies show that trees can sometimes reduce pollutants through deposition but can also increase concentrations locally by reducing ventilation in street canyons or through species-specific biogenic emissions, especially under heatwave conditions. This supports the scenario's decision not to rely on broad air-quality improvement as a primary payment trigger.

The **temporal framework** combines a medium-term policy/programming window with ongoing annual or multi-annual management contracts and periodic review. This was selected because urban cooling and well-being benefits depend on sustained maintenance and management (e.g., canopy care, watering, safety, accessibility, use conditions), not only on one-off planting or infrastructure investment. The Social Climate Fund (SCF) and ERDF urban programming cycles provide a relevant institutional timeframe for financing, while annual/rolling management contracts improve operational flexibility for local authorities and managers. The SCF is explicitly designed to operate from 2026 to 2032 and to support fair transition measures before and during the rollout of ETS2 impacts.

The **geographical scope** (urban and peri-urban forests/green corridors, prioritising heat-stress hotspots and socio-economically vulnerable neighbourhoods) was selected because both climate risk and access to green-space benefits are unevenly distributed within cities. The EEA has documented socio-economic inequalities in access to urban green and blue spaces across Europe and highlights the importance of targeted action for vulnerable groups and neighbourhoods. The scenario therefore combines biophysical targeting (heat hotspots) and social targeting (vulnerable neighbourhoods), which strengthens the policy case for public funding and improves alignment with adaptation and equity objectives.

The **financial mechanism** in Scenario 5 is a public–private mix with EU public funding as a core enabler, structured around:

- EU urban/cohesion funding (including ERDF-supported urban development instruments) for capital investment and strategic urban green infrastructure deployment,
- municipal budgets for ongoing management and maintenance,
- and developer contributions / levies (where available under national or local planning rules) as complementary co-financing for establishment and/or maintenance.

This is a coherent and realistic structure because the ERDF already has a strong urban development focus and reserves a dedicated share for sustainable urban development strategies, while cities remain the key actors for day-to-day management finance. The Social Climate Fund is also relevant to this scenario because it is explicitly designed to support vulnerable households and small businesses affected by the green transition and operates in the 2026–2032 period, creating a policy window for socially targeted urban adaptation measures in Member State plans.

The **implementation control system** is designed around high-attribution, locally measurable indicators rather than broad city-wide proxies. The core control logic combines:

- local temperature / heat exposure indicators (e.g., surface or air temperature measurements in targeted locations),
- canopy cover/condition and vegetation structure indicators (supported by remote sensing and on-site verification),
- accessibility and use indicators (e.g., access distance, visitation/use proxies where feasible),
- and verification of agreed management and maintenance actions.

This design is more robust than relying on city-wide air-quality trends or broad health indicators as payment triggers, because those signals are often strongly influenced by external drivers (transport policy, emissions trends, meteorology, demographic factors). WHO and EEA materials support the use of urban green-space accessibility and health-relevant indicators, while the scientific literature supports local-scale thermal indicators and canopy-condition metrics as practical and policy-relevant for urban greening interventions.

The **payment design** is an action-based PES scheme for ongoing management and maintenance, complementing capital funding for green infrastructure establishment or expansion. This is a crucial design choice. It separates two functions that are often mixed in urban programmes:

1. capital investment (creating or upgrading green infrastructure), and
2. service delivery and maintenance (the ongoing work required to sustain cooling, access and well-being benefits).

An action-based design is particularly appropriate here because the most policy-relevant outcomes in this scenario depend on sustained management quality, while some broader impacts (especially air quality and health outcomes) remain difficult to attribute directly to specific contracts. The scenario therefore uses PES logic where it is strongest: conditional payments for verifiable management and maintenance that support public ecosystem-service delivery.

The **promotion and facilitation mechanisms** are embedded in programme design and urban governance rather than treated as generic outreach. This includes:

- integrating PES-style maintenance contracts into urban funding rules and strategies,
- creating dedicated budget lines or eligibility provisions for long-term management (not only capital works),
- technical guidance and peer-learning support for municipalities,
- and programme selection criteria that prioritise heat-vulnerable and socially vulnerable areas.

This is consistent with EU urban policy directions supporting urban greening, green infrastructure and sustainable urban development, and it addresses a common implementation bottleneck in cities: long-term maintenance is often under-resourced relative to project launch and construction phases.

Taken together, the recommended options form a coherent and feasible PES-compatible configuration for urban and peri-urban forest ecosystem services within EU and local public funding frameworks: a locally attributable service focus (cooling and well-being), medium-term programme alignment with ongoing management contracts, targeted urban geography based on heat and vulnerability, a mixed financial architecture anchored in EU and municipal public funding, proportionate local verification, and an action-based PES structure focused on maintenance and service delivery. The value of this scenario lies not only in the urban benefits it seeks, but in its potential to demonstrate how urban green infrastructure investment can be linked to long-term ecosystem-service management payments in a socially targeted and policy-credible way.

Interpretation note

This scenario is designed as an urban adaptation and well-being PES-compatible model that strengthens long-term management and maintenance of urban/peri-urban green infrastructure. It should therefore be interpreted as a mechanism for improving local cooling, access and service delivery conditions in priority areas, rather than as a strict results-only contract for city-wide air-quality or health outcomes.

Table 6. Recommended options of scenario 5 (Paying for urban cooling and well-being through urban and peri-urban forests)

Theme	Recommended Option
1. Forest ecosystem services targeted	Local climate regulation with co-benefit physical/psychological well-being enabled by urban green infrastructure (*CICES: Regulation & Maintenance → Micro- and local climate regulation, air quality regulation where local attribution is plausible; and Cultural → Physical and experiential interactions with the environment)*
2. Temporal framework	Medium-term delivery window aligned with EU urban programming periods (e.g. 2026–2032) with ongoing annual management contracts
3. Geographical scope	Urban and peri-urban forests and green corridors, with priority for heat-stress hotspots (biophysical targeting) + Neighbourhoods with higher vulnerability (socio-economic targeting)
4. Financial mechanism	Public–private: European Union cohesion/urban funding as capital support + municipal budgets for ongoing management + developer contributions/ planning-related levies (where available under national or municipal rules) earmarked for green infrastructure and maintenance.
5. Implementation Control Systems	Verification focused on high-attribution, low-noise indicators combining: Canopy cover and vegetation condition (remote sensing + on-site verification) + Accessibility and use indicators (e.g. proximity, access points, maintenance standards; optional visitor counts) + On-site verification of management and maintenance action (Air-quality indicators may be included only where monitoring is localised, and attribution is plausible (e.g. roadside corridors), and treated as contextual evidence rather than a primary payment trigger)
6. Payment design	Action-based, providing payments for ongoing management and maintenance of urban and peri-urban forests, complementing capital funding for green infrastructure establishment where relevant
7. Promotion and Facilitation Mechanisms within financial programme	Alignment with Sustainable Urban Development strategies supported under cohesion policy + Integration into municipal climate adaptation, health, and urban resilience plans + Dissemination of guidance, case studies, and tools through European urban policy networks and partnerships (e.g. Greening Cities Partnership, European Urban Initiative, ESPON, ICLEI) + Capacity-building and

	knowledge exchange supporting cities in designing and implementing PES-style maintenance contracts

Why this scenario?

Scenario 5 was selected because it addresses a rapidly growing European policy challenge: urban heat exposure and unequal access to high-quality green space, with direct implications for climate adaptation, health, and social equity. This scenario captures a distinct PES integration pathway in the overall set because it links forest and green infrastructure management to urban climate and well-being objectives, rather than to biodiversity conservation, watershed protection, carbon removals, or wildfire prevention. In the European context, this is particularly relevant because cities increasingly need not only capital investment in green infrastructure, but also durable financing for its long-term management and maintenance in places where climate vulnerability and social need are most concentrated. By focusing on locally experienced and policy-relevant benefits such as cooling, accessibility, and well-being, the scenario reflects a practical and governance-compatible pathway for testing how PES-style approaches can support urban and peri-urban forest management. In short, Scenario 5 was chosen because it represents a targeted and policy-relevant model for integrating PES into urban adaptation and green-infrastructure governance in the European context.

Who benefits?

- **Urban residents (especially in vulnerable neighbourhoods):** cooler environments, improved access to green space, and health/well-being benefits
- **Municipalities / urban authorities:** support for climate adaptation and public health objectives
- **Peri-urban forest owners/land managers:** compensation for ongoing management that provides public urban benefits
- **Public health systems / local services:** reduced heat-related stress and improved urban liveability

Expected outcomes

- **Policy outcomes:** improved delivery of urban climate adaptation objectives with measurable neighbourhood-scale indicators (heat exposure, canopy condition, accessibility); better equity targeting in vulnerable areas.
- **Implementation outcomes:** a PES-compatible model that separates capital investment from long-term maintenance payments; control system combining ecological condition plus human-benefit indicators, supported where possible by existing urban monitoring frameworks.
- **Environmental outcomes:** maintained or increased canopy cover in priority zones; improved vegetation condition and survivability; sustained cooling performance where interventions are concentrated.
- **Socio-economic outcomes:** improved access to well-maintained green areas; stronger local resilience during heatwaves; clearer accountability for long-term maintenance performance.

3.1.6. Scenario 6 : Integrated landscape PES for bundled ecosystem services

Scenario 6 was selected to represent a distinct PES configuration in which multiple ecosystem services are contracted jointly at landscape scale, rather than treating one service as primary and the others only as incidental co-benefits. This scenario is important because many forest-management decisions simultaneously affect biodiversity, watershed functions and carbon storage, and because fragmented ownership can limit the ecological effectiveness of single-parcel contracts. A place-based PES literature has argued that bundling/layering services and multi-level governance can help address trade-offs and improve landscape-scale outcomes where ecosystem services are interdependent (Haines-Young & Potschin, 2018; European Commissionm, 2023; Reed et al., 2017; Reed et al., 2022; Kaiser et al., 2023; Banerjee et al., 2017; EU CAP Network, 2023; European Court of Auditors, 2022)

.Key feasibility challenge addressed by the scenario

A central challenge in landscape-scale PES is that the ecological case for coordination is often strong, but participation and implementation become more difficult when multiple land managers, multiple services and multiple funding sources are involved. In practice, transaction costs, coordination burdens and uneven local institutional capacity can reduce uptake, even when the environmental rationale is clear. Evidence from PES coordination research shows that transaction costs can significantly reduce participation, and that communication/coordination support can materially affect performance in spatially coordinated schemes.

For this reason, the scenario is designed as a collective, hybrid PES model with a public funding baseline, intermediary support, simplified group participation routes, and layered payments, so that coordination costs are managed rather than ignored. This is also consistent with recent work on collective PES, which suggests that outcomes can be promising where local institutions and social capital are sufficiently strong, but that collective approaches are context-dependent rather than universally applicable.

Recommended options

The ecosystem service focus in this scenario is framed as a bundle of multiple primary services (rather than one primary service plus co-benefits):

- habitat and gene pool protection (biodiversity),
- hydrological cycle regulation and water purification (watershed protection), and
- climate regulation through carbon storage.

This is a stronger basis for a bundled PES scenario because it clearly differentiates Scenario 6 from the other scenarios, where one service is primary. The use of CICES-aligned categories supports comparability and avoids mixing service outcomes with management actions. CICES explicitly provides a structured classification for Regulation and Maintenance services, including habitat/gene pool protection, hydrological regulation and climate regulation.

The scenario also recognises sustainable wood production as a compatible land-use outcome, but not as a paid ecosystem service in this PES design. This distinction is important for conceptual clarity and policy credibility: timber is a market product, whereas

the PES is intended to reward non-market ecosystem service provision. The European Commission's 2023 guidance on forest ecosystem service payment schemes explicitly notes that forests provide multiple services with synergies and trade-offs (including carbon sequestration and timber provision), and encourages scheme designers to identify and manage these trade-offs rather than assume services are independent.

The **temporal framework** (5–10 years with periodic review and adaptive management provisions) was selected because bundled landscape outcomes require sufficient time for coordinated management to take effect, but also need flexibility to adjust to changing participation, ecological responses and funding conditions. The Commission's forest PES guidance emphasises that forest management requires a long-term perspective and that longer timeframes can support stable participation and continuous ecosystem-service provision, while also recommending prioritisation and targeting where funding cannot cover all eligible areas.

The **geographical scope** is defined in functional landscape terms (e.g., Natura 2000 complexes, watersheds/sub-basins, ecological corridors, cross-border ecological regions), because the scenario is intended for contexts where ecological effectiveness depends on coordination across parcels and actors. This is consistent with the place-based PES literature, which argues that ecosystem-service interactions and trade-offs are often scale-dependent and require multi-level governance and landscape-sensitive design.

The **financial mechanism** is a public–private mix with EU public funding as the baseline, combined with service-specific co-financing where identifiable beneficiaries exist (e.g., utilities for watershed benefits, carbon buyers for certified climate benefits). This is a stronger and more feasible design than an open-ended funding list because it establishes a clear hierarchy:

1. public funding secures baseline collective management and participation, and
2. additional funding streams can be layered onto specific services where a beneficiary-pays logic is feasible.

This approach is consistent with the European Commission's forest PES guidance, which explicitly recognises EU funding, national funding (including State aid) and private initiatives as potential financing routes, and notes that schemes may support voluntary commitments, costs/income forgone, incentives beyond compensation, pilot/research functions, or results-based payments depending on the instrument. It is also aligned with recent literature on integrating ecosystem markets and blending public/private funding across multiple services and scales.

The public funding baseline is particularly well matched to CAP rural development cooperation and community-led local development (LEADER/CLLD-type approaches), because these instruments are explicitly designed to support cooperation, joint action and local coordination. The European Commission's rural development measures page (legacy RDP measure structure, still useful as design precedent) includes cooperation measures for joint environmental/climate actions and LEADER/CLLD support with cooperation, implementation and animation functions; it also notes that under the current CAP architecture, "cooperation" remains a broad policy measure. The EU CAP Network and the European Court of Auditors also describe LEADER/CLLD as a participatory, bottom-up approach managed by local action groups and used across multiple funding streams,

which supports its relevance as a coordination template for collective landscape arrangements.

The **implementation control system** is designed as service-specific monitoring combined at landscape scale for programme accountability, rather than a single composite score or an undefined “ecosystem dashboard.” This includes:

- indicators relevant to each contracted primary service (e.g., habitat-condition indicators, watershed indicators, carbon metrics),
- remote sensing for land-cover and structural change,
- on-site verification of agreed management actions,
- and aggregated reporting across participating land units.

This is a more feasible and transparent approach for a bundled PES because it preserves service-specific accountability while allowing landscape-level reporting and programme management. It is also consistent with the Commission’s forest PES guidance, which stresses the need to define scheme goals clearly, identify multiple services and trade-offs, and use a design process that starts from the service set and expected benefits/costs.

The **payment design** is a hybrid PES (collective) with layered payments:

- an action-based base payment for coordinated management measures across the landscape, and
- results-based bonuses/components linked to agreed indicators for the contracted services.

This structure is appropriate because a pure results-only scheme would be too complex and risky when multiple services and multiple land managers are involved, while a pure action-only scheme would weaken outcome credibility. A hybrid collective structure also fits the evidence on coordination incentives and participation barriers: transaction costs and coordination burdens are real, so a stable base payment is important for uptake, while performance-linked components help retain environmental accountability.

The **promotion and facilitation mechanisms** are embedded in the funding programme and are central to feasibility in this scenario. These include:

- support for intermediary organisations / coordinating bodies,
- technical assistance for collective planning and group applications,
- simplified procedures for group participation,
- and incentives for cooperation among neighbouring land managers.

This design choice is strongly justified by both collective PES literature and policy practice. Collective PES outcomes are linked to local institutional capacity and social capital, and LEADER/CLLD experience in the EU demonstrates the importance of animation, coordination and local governance support in bottom-up, multi-actor programmes.

Taken together, the recommended options form a coherent and feasible PES configuration for bundled ecosystem services at landscape scale: multiple primary services (biodiversity, watershed protection and carbon storage), medium-term voluntary collective agreements, functional landscape targeting, a public-funded coordination baseline with service-specific co-financing, service-specific monitoring aggregated for landscape-level reporting, and a

hybrid collective payment structure with layered incentives. The value of this scenario lies not only in the ecological outcomes it seeks, but in its potential to demonstrate how multi-service forest PES can be incorporated into EU-compatible funding programmes in contexts where coordinated landscape management is necessary for effectiveness.

Interpretation note

This scenario is designed as a context-dependent collective PES model for landscapes where ecological effectiveness requires coordination across multiple land managers and services. It should therefore be interpreted as an option for suitable governance contexts with coordination capacity and intermediary support, rather than as a universal template for all forest PES programmes.

Table 7. Recommended options of scenario 6 (Paying for bundled forest ecosystem services at landscape scale)

Theme	Recommended Option
1. Forest ecosystem services targeted	Bundled primary services: habitat and gene pool protection + hydrological cycle regulation and water purification + global climate regulation *(CICES: Regulation & Maintenance → lifecycle maintenance and habitat protection; hydrological cycle regulation, global climate regulation).*
2. Temporal framework	Medium-term (5–10-year) landscape contracts, with periodic review and adaptive management provisions
3. Geographical scope	Functionally defined forested landscapes where coordinated management influences multiple services, such as: Large Natura 2000 complexes + Mountain regions + Forested watersheds or river sub-basins + Cross-border forest landscapes
4. Financial mechanism	Public–private: (EU and national public fund) Rural development cooperation instrument (CAP Pillar II / community-led approaches) as baseline + service-specific co-financing by identifiable beneficiaries (e.g., utilities, carbon buyers, tourism stakeholders) where applicable
5. Implementation Control Systems	Service-specific monitoring combined at landscape scale: ES Indicators (e.g. habitat condition, watershed indicators, carbon metrics) + Remote sensing for land-cover and structural changes + On-site verification of agreed management actions across participating land units + Aggregated reporting of outcomes for programme accountability
6. Payment design	Hybrid (collective): action-based payments for coordinated management measures + results-based bonuses linked to landscape-scale service indicators, while payments are distributed to participants based on agreed rules

7. Promotion and Facilitation Mechanisms within financial programme	Support for landscape-scale coordination: Funding for intermediary organisations or coordinating bodies + Technical assistance for collective planning and applications + Simplified procedures for group participation + Incentives for cooperation among neighbouring land managers

Why this scenario?

Scenario 6 was selected because it addresses a structural limitation in many forest PES designs: the fragmentation of ecosystem services and management across landscapes where biodiversity, water regulation, and carbon storage are ecologically interdependent. In many European forest contexts, fragmented ownership and parcel-based contracting reduce ecological effectiveness, particularly where services such as habitat connectivity, watershed protection, and landscape-scale carbon storage depend on coordinated action across multiple properties. A single-service approach is often insufficient in such settings. This scenario was retained because evidence and workshop discussions consistently highlighted the need for more integrated, place-based PES configurations that can contract multiple primary ecosystem services jointly rather than treating one service as dominant and the others as incidental co-benefits. By structuring payments at the landscape scale and supporting collective participation mechanisms, the design seeks to overcome coordination barriers while maintaining service-specific accountability. In short, Scenario 6 was chosen because it provides a policy-compatible model for bundled, landscape-scale forest PES in contexts where coordinated management is necessary to achieve meaningful ecological outcomes.

Who benefits?

- **Forest owners and other land managers participating collectively**: access to payments that depend on coordination and landscape scale
- **Local and regional authorities**: more efficient delivery of biodiversity, watershed, and climate objectives through integrated management
- **Identifiable service beneficiaries (where applicable)**: e.g., water utilities, carbon buyers, tourism actors benefiting from improved landscape functions
- **Rural communities and landscapes**: stronger cooperation, reduced fragmentation, and improved multifunctionality

Expected outcomes

- **Policy outcomes:** demonstrable multi-objective delivery in selected functional landscapes; stronger coherence across biodiversity, water and climate policy goals where services are interdependent.
- **Implementation outcomes:** tested collective hybrid design with layered finance (public baseline plus service-specific co-financing) and service-specific indicators aggregated at landscape scale (avoiding a single composite score that weakens conditionality).
- **Environmental outcomes:** combined improvements in habitat condition, watershed function, and carbon storage trends (interpreted per service); reduced trade-offs through explicit planning and monitoring.
- **Socio-economic outcomes:** strengthened cooperation and trust among participating land managers; increased participation through reduced individual transaction costs (via

intermediaries and group applications); improved perceived fairness and local legitimacy of environmental payments where distribution rules are transparent; potential local employment/skills benefits linked to coordinated planning, monitoring, and management activities.

3.1.7. Scenario 7 : Securing drinking water at its source through utility-led PES

Scenario 7 was selected to represent a utility-led PES model for drinking-water source protection, which is institutionally and financially distinct from the broader watershed-scale public PES model in Scenario 2. The core logic here is a direct beneficiary-pays relationship: a drinking-water utility (or water service provider) has a clear operational interest in upstream source-catchment management because source-water quality affects treatment complexity, risk management, and long-term supply reliability. This scenario is also highly relevant to the EU policy context because the recast Drinking Water Directive (Directive (EU) 2020/2184) is built around protecting human health and includes a risk-based approach that explicitly covers catchment areas for abstraction points, linking source protection to drinking-water safety (European Commissiond&n; European Union, 2020; Bennett et al., 2014; Price & Heberling, 2018; Goldman-Benner et al., 2012; Haines-Young & Potschin, 2018)

Key feasibility challenge addressed by the scenario

A central challenge in utility-led drinking-water PES is that utilities need credible evidence that upstream management improves source protection, but many water-quality signals are influenced by factors outside the contract (weather variability, background pollution trends, land uses outside the scheme, and time lags). This makes strict results-only payment designs difficult to apply fairly, even when utilities have strong incentives to pay.

For this reason, the scenario is designed as a hybrid utility-led PES model that combines action-based payments for agreed watershed protection measures with results-based components only where attribution is sufficiently plausible (e.g., targeted raw-water indicators at abstraction points and upstream monitoring locations interpreted with modelling support). This reflects well-established lessons in watershed PES practice, where monitoring is important but uncertainty and attribution limits must be managed explicitly.

Recommended options

The ecosystem service focus in this scenario is framed as watershed protection for drinking-water supply (CICES-aligned under Regulation and Maintenance services), enabled by forest cover maintenance, reduced chemical inputs, erosion control, and riparian buffering. This framing is stronger than generic “water services” language because it identifies the relevant service logic more precisely: forest and land management in source catchments influences water quality regulation, erosion control, and hydrological regulation relevant to drinking-water abstraction. CICES provides a suitable classification basis for this because it distinguishes these regulation functions clearly.

The **temporal framework** (10–30-year contracts aligned with utility asset cycles, with periodic review) was selected because drinking-water infrastructure planning and source protection decisions are inherently long-term. Utilities plan and finance treatment assets,

abstraction systems, and risk management measures over long horizons, and source-catchment improvements may require sustained land-management commitments to deliver stable protection benefits. A long contract period therefore improves alignment with utility decision-making and supports continuity of source protection, while periodic review allows adaptive adjustment and contract oversight. This timing also fits the risk-based source-to-tap logic of the Drinking Water Directive, which treats catchment risk management as an ongoing governance function rather than a one-off intervention.

The **geographical scope** (upstream source catchments supplying major drinking-water systems, including protected abstraction zones) is one of the defining strengths of this scenario. It was selected because it creates a direct and operationally meaningful upstream–downstream link between management action and utility-relevant outcomes. This is what differentiates Scenario 7 from Scenario 2: Scenario 2 is a broader watershed-scale public programme model, whereas Scenario 7 is a source-catchment protection model tied to specific drinking-water systems and utility planning boundaries. The Drinking Water Directive's risk-based approach to catchment areas for abstraction points reinforces the relevance of this source-catchment framing.

The **financial mechanism** is a utility-led public–private mix, with regulated water tariffs or service charges as the primary funding source, complemented by targeted public co-funding for restoration, monitoring capacity, or broader public-good elements where justified. This is a coherent design because utilities often have stable revenue streams and a direct incentive to reduce raw-water quality risks and treatment pressures, while some investments in source protection also generate wider public benefits. Evidence on utility participation in watershed PES shows that utilities can be durable and influential institutional buyers, but schemes often remain stronger when embedded in broader governance frameworks and when start-up/coordination costs are supported.

The **implementation control system** is designed as a proportionate combination of:

- compliance monitoring of agreed land-management measures,
- targeted raw-water quality indicators (e.g., nitrate, pesticide concentrations, turbidity/sediment-related indicators),
- periodic upstream sampling at representative locations,
- remote sensing to verify land cover and buffer integrity,
- and hydrological/water-quality modelling to interpret trends and external influences.

This is a stronger and more realistic design than relying on abstraction-point water quality alone as a direct payment trigger, because source-water indicators can improve or deteriorate for reasons unrelated to the PES contract. Reviews of source-water quality and treatment cost relationships show why utilities care about source conditions, but they also underscore the complexity of drawing simple causal conclusions from water-quality changes. The scenario therefore combines utility-relevant indicators with modelling and compliance checks, which improves both credibility and fairness.

The **payment design** is a hybrid PES scheme with:

- an action-based core for agreed watershed protection measures (e.g., forest cover maintenance, riparian protection, input reduction, erosion control), and
- results-based components linked to raw-water quality outcomes where attribution is sufficiently feasible.

This structure is appropriate because it preserves a clear contractual basis for payment while allowing utilities to retain an outcome orientation. A pure results-only design would expose land managers to excessive uncontrollable risk, while a pure action-only model could weaken the utility's confidence in the scheme's effectiveness. A hybrid design is therefore a more credible fit for source-catchment PES under real-world hydrological uncertainty. This is also consistent with EU guidance on forest ecosystem service payment schemes, which recognises that different instruments may use costs/income-forgone compensation, incentives beyond compensation, and results-based elements depending on the service and monitoring conditions.

The **promotion and facilitation mechanisms** are embedded in utility planning and programme design rather than treated as generic communication measures. This includes:

- integration with drinking-water source protection planning and regulatory compliance processes,
- utility–landowner facilitation and advisory support,
- technical guidance on eligible watershed protection measures,
- model long-term contract structures to reduce transaction costs,
- and monitoring/data-management support.

This is especially important in utility-led PES because trust, contract clarity, and long-term coordination are often decisive for participation and continuity. The utility engagement literature and watershed PES practice both indicate that institutional design and facilitation are central to durable implementation, not just the payment itself.

Taken together, the recommended options form a coherent and feasible PES configuration for drinking-water source protection: a source-catchment watershed service focus, long-term utility-aligned contracts, targeted geography around abstraction systems, a tariff-based utility funding core with strategic public co-support, proportionate monitoring with modelling, and a hybrid payment structure that balances utility outcome needs with land-manager feasibility. The value of this scenario lies not only in the water-quality outcomes it seeks, but in its potential to demonstrate how utility-led PES can be operationalised as a credible source-protection instrument within EU drinking-water and environmental governance frameworks.

Interpretation note

This scenario is designed as a utility-led source-catchment PES model for improving long-term drinking-water source protection under real-world monitoring uncertainty. It should therefore be interpreted as a mechanism for strengthening preventive upstream management and utility–landowner cooperation, rather than as a strict results-only contract guaranteeing short-term improvements in all raw-water quality indicators.

Table 8. Recommended options of scenario 7 (Paying for drinking water source protection through utility-led PES

Theme	Recommended Option
1. Forest ecosystem services targeted	Watershed protection for drinking-water supply enabled by forest cover, low-input management, erosion control, and riparian buffering

	(CICES: Regulation & Maintenance → Regulation of the chemical condition of freshwaters (water quality regulation)
2. Temporal framework	Long-term contracts (10–30 years) aligned with drinking-water infrastructure planning and utility asset cycles, with periodic compliance and performance reviews
3. Geographical scope	Upstream source catchments supplying major drinking-water systems, including protected abstraction zones
4. Financial mechanism	Public–private: utility tariffs/service charges as primary funding + targeted public co-funding for restoration and monitoring capacity (EU or national programmes (Interreg/LIFE)
5. Implementation Control Systems	Compliance monitoring of agreed land-management measures combined with targeted water-quality indicators (Nitrate and pesticide concentrations at abstraction points, Turbidity and sediment load indicators) + Periodic upstream sampling at representative locations + Remote sensing to verify land cover and buffer integrity + Hydrological or water-quality modelling to interpret trends and external influences
6. Payment design	Hybrid: Action-based payments for agreed watershed protection measures + results-based components linked to raw water quality outcomes at abstraction points where attribution is feasible.
7. Promotion and Facilitation Mechanisms within financial programme	Integration into drinking-water source protection planning and regulatory frameworks (primarily the recast Drinking Water Directive risk-based approach, with WFD coordination where relevant) + Utility–landowner coordination mechanisms and advisory support + Technical guidance on watershed protection measures + Model long-term contract structures to reduce transaction costs + Capacity support for monitoring and data management

Why this scenario?

Scenario 7 was selected because it addresses a clearly identifiable, operational policy challenge: securing long-term drinking-water quality at its source through upstream land management. While it shares a hydrological focus with Scenario 2, it is conceptually and institutionally distinct. Scenario 7 is anchored in specific source catchments linked to defined drinking-water systems, where a clearly identifiable beneficiary—the water utility—has direct financial and regulatory incentives to invest in upstream protection measures.

Project discussions and earlier findings highlighted that utilities across Europe face rising treatment complexity, compliance pressures, and long-term supply risks, while preventive catchment management can often be more cost-effective and durable than relying solely on downstream treatment technologies. This creates a strong and economically grounded “beneficiary pays” logic. In this scenario, utilities are not peripheral co-funders but

structured anchor payers within a formalised PES arrangement, complemented by public support where broader public-good elements are involved.
In short, Scenario 7 was chosen because it illustrates a targeted and governance-compatible utility-led PES pathway for drinking-water source protection—one of the most policy-relevant and potentially durable PES configurations in the European context when carefully designed.

Who benefits?

- **Water utilities / drinking-water providers**: lower treatment costs, reduced operational risk, and more secure raw water quality
- **Forest owners/land managers**: stable long-term payments for source protection measures that may otherwise reduce income from timber production.
- **Citizens/society**: safer drinking water supply and greater resilience of public water services.
- **Public authorities**: progress on source protection and water policy objectives, reduced environmental risks to critical infrastructure, and co-benefits for other reservoir functions where applicable, supported through targeted co-funding rather than full public financing.

Expected outcomes

- **Policy outcomes:** improved preventive source-protection outcomes in designated catchments; clearer operational linkages between land management contracts and drinking-water risk management frameworks.
- **Implementation outcomes:** a realistic hybrid contract model combining action-based payments with results-based components only where attribution is plausible; improved trust via monitoring plus modelling interpretation of “noisy” indicators.
- **Environmental outcomes:** reduced erosion and pollutant risk in source catchments; strengthened riparian function and buffer integrity; improved multi-year trends in key raw-water risk indicators (interpreted with context).
- **Socio-economic outcomes:** reduced long-term treatment and risk-management costs; improved reliability of public water services and reduced vulnerability to contamination episodes.

3.2 Cross-scenario comparison of preliminary recommended options

To complement the individual presentation of the seven preliminary scenarios, this section provides a cross-scenario comparison of the recommended options across the seven common design themes used in this deliverable. While the previous subsections described each scenario as a coherent PES configuration in its own right, the matrix below allows a more systematic comparison of how the scenarios differ in terms of ecosystem service focus, temporal framework, geographical scope, financial architecture, implementation control systems, programme type, and promotion and facilitation mechanisms. In this way, the comparison helps to make both the common structure and the main points of variation across the scenario set more explicit.

Taken together, the comparison matrix highlights that the seven preliminary scenarios are built on a shared methodological structure, but represent clearly differentiated pathways for integrating PES into EU funding programmes. Some scenarios rely on existing large-scale EU instruments, others on territorially targeted or sector-specific arrangements; some favour public funding anchors, while others combine public and private finance; and

some are based on individual contractual logic, whereas others depend on coordination at landscape or catchment level. This comparative overview therefore provides a useful synthesis of the preliminary recommendations and a practical basis for the subsequent stakeholder co-design process, in which the relative feasibility, challenges, and enabling conditions of the different pathways can be discussed in more detail.

Table 9. Cross-scenario comparison matrix of preliminary options across the seven design themes

Design theme	S1 Biodiversity / CAP	S2 Basin-scale watershed	S3 Carbon removals	S4 Wildfire risk reduction	S5 Urban cooling & well-being	S6 Bundled landscape-scale services	S7 Utility-led drinking-water protection
1. Forest ecosystem services targeted	Biodiversity: habitats and gene pool protection	Water quality and flow regulation	Climate regulation through long-term carbon sequestration and storage	Regulation of disturbance impacts through reduced wildfire spread potential	Local climate regulation with well-being co-benefits	Bundled services: biodiversity + water regulation + climate regulation	Watershed protection for drinking-water supply
2. Temporal framework	Medium term: **5–7 years**, aligned with CAP cycles, periodic review	Long term: **10–20 years**, aligned with WFD basin planning cycles	Long term: **20–50 years**, with permanence and verification requirements	Medium term: **5–10 years**, with review of compliance and risk conditions	Medium term: aligned with urban programming periods, with annual management contracts	Medium term: **5–10 years**, with adaptive review	Long term: **10–30 years**, aligned with utility planning and asset cycles
3. Geographical scope	Natura 2000 sites and priority biodiversity hotspots	Upstream forest areas in high-risk river basins, including transboundary catchments	EU-wide, with region-specific mitigation practices	High wildfire hazard regions, especially WUI zones	Urban and peri-urban forests / green corridors, prioritising heat hotspots and vulnerable neighbourhoods	Functionally defined forest landscapes: Natura 2000 complexes, mountain regions, watersheds, cross-border landscapes	Upstream source catchments supplying major drinking-water systems, including protected abstraction zones
4. Financial framework	**EU public funding only**: CAP Pillar I eco-schemes	**Public–private**: State aid + water utility co-financing	**Public–private**: EU climate instrument + regulated/compliance carbon buyers + buffer reserve	**Public public/state aid**, with possible EU co-financing	**Public–private**: EU cohesion/urban funding + municipal budgets + developer/planning contributions	**Public–private**: EU/national baseline funding + service-specific beneficiary co-financing	**Public–private**: utility tariffs/service charges + targeted public co-funding
5. Implementation control systems (MRV)	Habitat-quality indicators + remote sensing + on-site verification + CAP checks	Water-quality and hydrological indicators + monitoring stations + modelling	CRCF-aligned carbon accounting + remote sensing + ground data + reversal-risk buffers	Verification of preventive measures + remote sensing + on-site checks + fire-risk tools	Canopy/vegetation condition + accessibility/use indicators + on-site checks	Service-specific indicators combined at landscape scale + remote sensing + on-site checks + aggregated reporting	Compliance monitoring + water-quality indicators at abstraction points + upstream sampling + remote sensing + modelling

6. Payment design	**Hybrid**: action-based base + ecological performance bonus	**Hybrid**: action-based practices + result-informed bonus	**Hybrid**: upfront/milestone support + results-based payments for verified removals	**Action-based** with risk-reduction performance bonuses	**Action-based** management and maintenance payments	**Hybrid collective**: coordinated action-based payments + landscape-scale results bonuses	**Hybrid**: action-based payments + results-based elements where attribution is feasible
7. Promotion and facilitation mechanisms	CAP Strategic Plan integration + EU guidance + Member State tools + advisory/intermediary support + collective options	Regional/cohesion programme integration + incentives for upstream participation + utility–landowner partnerships	CRCF recognition + financial instruments for upfront investment + guidance for buyers and emitters	Dedicated prevention funding windows + incentives for coordinated participation + collective applications + alignment with wildfire strategies	Integration with urban adaptation/health/resilience plans + urban policy networks + capacity-building	Funding for coordinating bodies + technical assistance + simplified group procedures + incentives for cooperation	Integration into drinking-water source protection planning + utility–landowner coordination + technical guidance + model contracts + monitoring/data support

4. Stakeholder co-design process

4.1 Objectives of the co-design process

The stakeholder co-design process was organised through the final ProForPES workshop as a structured step to engage relevant stakeholders with the seven scenarios and recommended options developed under Task 4.1. Its purpose was to bring these preliminary options into dialogue with policy, implementation, and practice perspectives in order to support their further refinement.

More specifically, the co-design process pursued four main objectives. First, it aimed to review and discuss the preliminary guidelines and recommendations for integrating PES and PES-related mechanisms into EU funding programmes. Second, it aimed to assess the feasibility of the proposed scenarios and their recommended options, taking into account existing policy frameworks, funding structures, and administrative conditions. Third, it aimed to identify key challenges, risks, and gaps, including legal, institutional, financial, and technical constraints that may affect implementation. Fourth, it aimed to identify enabling conditions and required actions, particularly from the perspective of public authorities and programme design.

These objectives were addressed through an open and structured discussion format that combined comparative assessment across scenarios with more detailed exploration of selected PES integration pathways.

4.2 Stakeholder composition

The co-design process was based on an invitation-only workshop bringing together a selected group of stakeholders with expertise relevant to PES design, policy, and implementation. The composition of participants was intentionally multi-actor in order to reflect the different roles involved in PES schemes and their integration into EU funding programmes.

4.2.1 The invited stakeholders included:

- **forest owners and land managers**, contributing practical knowledge on implementation feasibility and management implications;
- **public authorities and policymakers**, providing perspectives on legal frameworks, administrative requirements, and programme design;
- **NGOs, facilitators, and intermediary organisations**, contributing experience in coordination, communication, and implementation support;
- **researchers and technical experts**, providing input on ecosystem services, indicators, and monitoring systems;
- **market actors and private-sector representatives**, particularly relevant for scenarios involving mixed funding models and private participation.

This composition ensured that the co-design process captured a diversity of perspectives across governance levels and sectors. It also allowed the scenarios to be assessed not only in conceptual terms, but with regard to their practical feasibility, institutional fit, and potential for implementation within EU funding frameworks.

4.2.2 Basic participation statistics

A broad invitation and follow-up process was undertaken to ensure a diverse and relevant participant group for the workshop.

In total, **239 persons were contacted**, and **81 responded with interest** in participating. However, for various practical and scheduling reasons, not all interested persons were able to confirm their participation, and some later withdrew.

As a result, **35 participants** ultimately took part in the workshop. The participant group reflected a diversity of professional backgrounds and institutional affiliations, including representatives from public authorities, research organisations, NGOs, intermediary bodies, and the private sector. This diversity was intended to ensure a broad range of perspectives in the discussion, covering policy, implementation, technical, and market-related dimensions of PES.

Participants were drawn from multiple European countries, contributing to a geographically diverse discussion and enabling the consideration of different national and regional contexts in the assessment of the scenarios. Figures 1 and 2 present the distribution of participants by sector and country, illustrating the multi-actor and geographically diverse composition of the workshop.

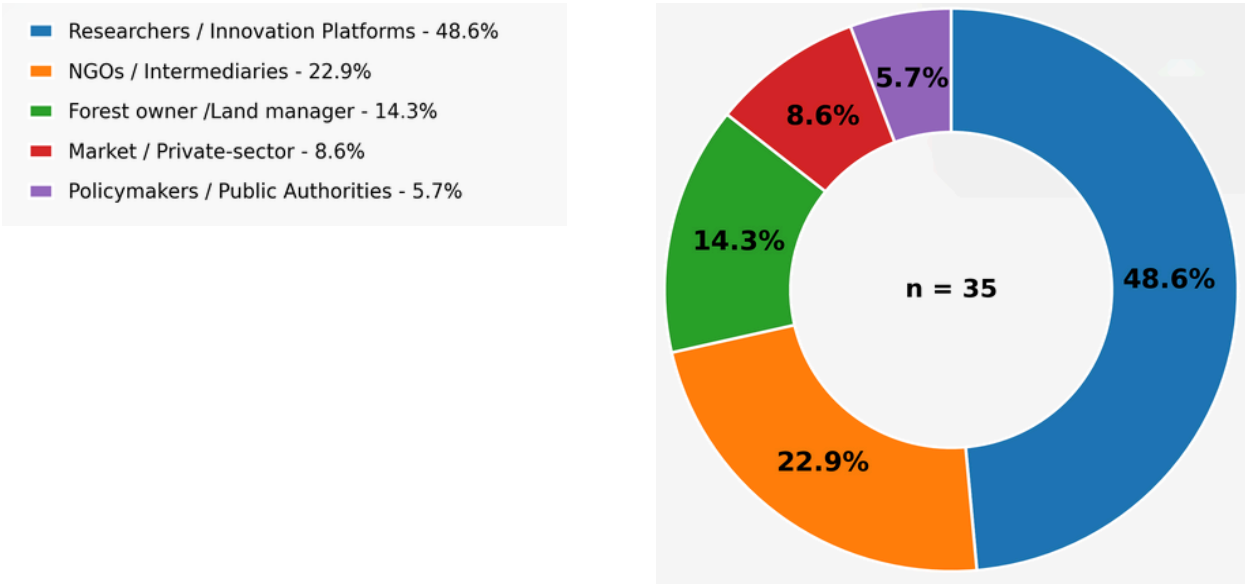

Figure 1. Participants' sector

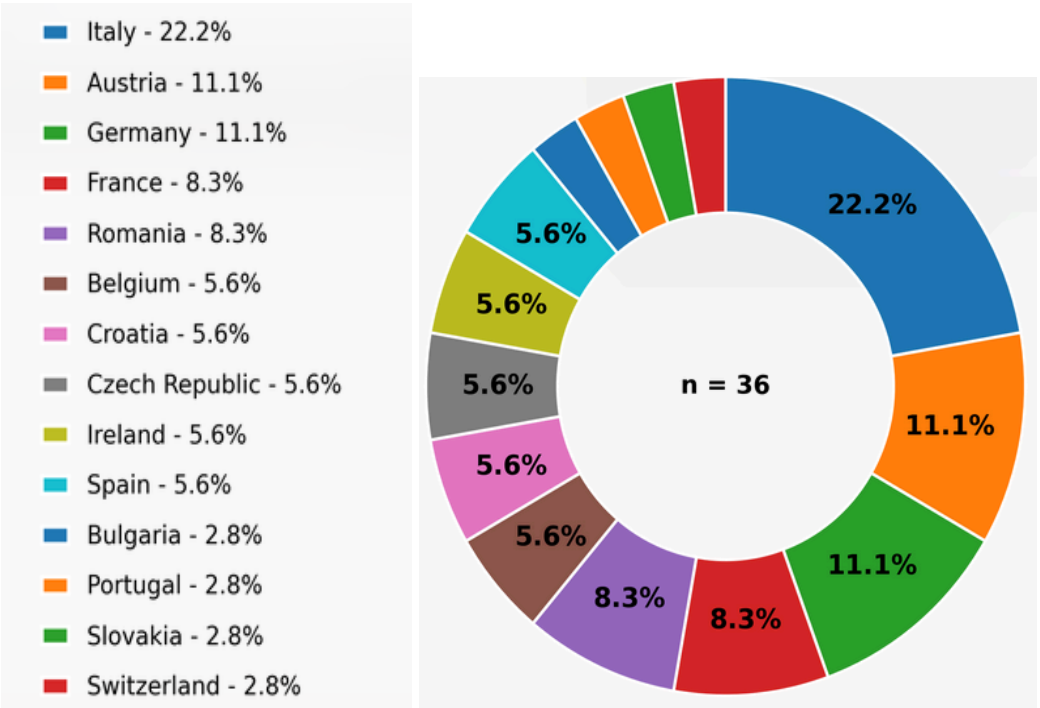

Figure 2. Participants' country

4.3 Workshop design and methods

4.3.1 Preparation and workshop concept

The workshop was designed as a structured co-design exercise linking the analytical work of Task 4.1 with the subsequent refinement of recommendations under Task 4.2. It was conceived as a full-day event combining plenary sessions, interactive formats, and facilitated discussions in order to enable both broad comparison and in-depth analysis of the scenarios. The overall methodological approach followed a progressive logic:

1. establishing a shared understanding of the project context and analytical basis,
2. enabling initial comparative assessment across the full set of scenarios,
3. and facilitating more detailed discussion of selected scenarios and their implementation conditions.

This design ensured that stakeholder input was both informed and structured, while remaining directly linked to the preliminary options developed in this deliverable.

4.3.2 Stakeholder invitation and preparation materials

Participation in the workshop was based on a targeted invitation process to ensure focused and high-quality discussion. In advance of the event, participants received preparatory materials, including a **briefing pack** presenting the project context, key findings from WP2 and WP3, and an overview of the preliminary scenarios.

These materials were intended to:

- familiarise participants with the analytical background,
- ensure a common level of understanding prior to the workshop,
- and allow participants to engage more effectively in the discussions.

Additional materials, including the invitation, registration form, and briefing documents, are provided in the Appendix.

4.3.3 Workshop structure and process

The day will begin with plenary framing sessions, including project presentations and a keynote, which will introduce the objectives of the workshop, the analytical results of previous work packages, and the rationale behind the scenario development. This opening session will establish a shared understanding of the policy context, the purpose of the scenarios, and the validation task expected from participants.

This will be followed by a Gallery Walk, in which the seven scenarios will be presented visually through posters (Appendix C). Participants will circulate between stations, interact with scenario facilitators, and provide initial feedback using sticky notes. In parallel, a colour-based voting system will be used to capture participants' first assessment of the relevance and feasibility of each scenario. This format will allow participants to engage comparatively with all scenarios before moving into more focused discussion.

Based on this initial assessment, selected scenarios will be taken forward into breakout group discussions in the afternoon. Each table will be supported by two project partners:

one acting as facilitator and one as note taker and timekeeper. The breakout discussions will follow a structured multi-round format. In the first round, participants will be invited to share practical experience from their own country, region, or field of work, including evidence that supports or challenges the scenario and reflections on feedback received during the morning session. In the second round, discussion will become more focused and will be guided by a predefined set of scenario-specific questions addressing the logic of the scenario, the realism of the proposed options, implementation feasibility, and enabling conditions. Participant feedback will be captured both through discussion notes and through sticky notes recording key issues, challenges, and possible actions (For the feedback forms template see Appendix F). In a final wrap-up round, groups will synthesise the main messages and prepare key points for plenary reporting.

The workshop will conclude with plenary reporting, during which a rapporteur from each breakout group will present the main points emerging from the discussion. This final session will support cross-group comparison and help identify recurring themes, shared feasibility concerns, and common recommendations across the scenario set.

4.3.4 Question and feedback framework

A central methodological element of the workshop was the use of a structured question and action framework to guide stakeholder input and ensure comparability across scenarios.

The framework was designed to move from general validation to implementation-oriented reflection and was organised around four main dimensions:

- **Scenario validation**: assessing whether the overall logic and structure of the scenario are realistic and coherent
- **Assessment of recommended options**: evaluating the feasibility and appropriateness of the selected design features
- **Identification of challenges and risks**: identifying barriers, constraints, and potential unintended effects
- **Enabling actions and policy needs**: identifying what public authorities and programme designers would need to do to make the scenario operational

Feedback was collected using multiple formats, including sticky notes, structured posters, and facilitator notes. This ensured that both qualitative insights and structured responses were captured in a consistent manner.

The full set of guiding questions and action prompts used during the workshop is provided in the Appendix.

4.4 Link to Task 4.2 and use of workshop results

The co-design process described above provides a key input for Task 4.2, which focuses on the development of final guidance and recommendations for the integration of PES into EU funding programmes.

While this deliverable (Task 4.1) presents preliminary scenarios and recommended options, Task 4.2 builds on these results by incorporating stakeholder feedback collected through the workshop and related consultations. The workshop therefore serves as a

structured validation and refinement step, providing insights on feasibility, implementation challenges, and enabling conditions across the different PES integration pathways.

The feedback collected will be synthesised and used to adjust and further develop the preliminary options presented in this report, contributing to the formulation of more targeted and operational recommendations in Deliverable 4.2.

5. Key takeaways and final reflections

The analysis carried out in task 4.1 demonstrates that structuring PES design through the seven themes provides a coherent and practical framework for organising the wide diversity of ecosystem service mechanisms across Europe. By applying these themes consistently, it becomes possible to compare different PES configurations, identify recurring design patterns, and translate complex arrangements into policy-relevant options. The scenarios developed in this work are not abstract constructs but reflect realistic pathways for integrating PES into existing EU financial instruments, such as the CAP, ERDF, LIFE, CRCF, and utility-based funding schemes. This ensures that the proposed options remain grounded in current institutional and financial realities.

Across the scenarios, several consistent tendencies emerge. Targeted implementation, particularly in ecologically or functionally sensitive areas such as Natura 2000 sites, water catchments, and climate-vulnerable regions, appears to be a key condition for achieving meaningful environmental outcomes. At the same time, proportional and context-specific monitoring and verification systems are essential to balance credibility with feasibility, especially in relation to administrative burden and participation of smaller landowners. The combination of funding sources, including public programmes and complementary private or utility-based contributions, further reflects a growing recognition that single-source financing is often insufficient to sustain PES schemes over time.

The findings also confirm the central role of public authorities in shaping PES implementation. Their responsibilities extend beyond financing to include setting eligibility rules, defining conditionality, ensuring monitoring and verification, and facilitating coordination across sectors and governance levels. Without this institutional anchoring, PES schemes risk becoming fragmented, inconsistent, or vulnerable to short-term policy changes. At the same time, the involvement of other actors, such as intermediaries, forest owners, utilities, and private investors, remains essential for operationalisation, although their roles must be aligned with realistic incentives and capacities.

The stakeholder workshop is therefore a critical step in moving from preliminary configurations to validated and actionable recommendations. Rather than developing PES designs from scratch, the workshop focuses on assessing the relevance, feasibility, and robustness of the proposed scenarios and options. This allows participants to engage with concrete examples, identify practical constraints, and suggest targeted adjustments. The structured set of questions, ranging from scenario validation to enabling conditions, ensures that feedback is directly linked to the seven themes and can be systematically incorporated into the final guidelines.

Overall, the approach developed in this deliverable provides a structured and evidence-based foundation for exploring how PES schemes can be integrated into EU financial programmes. By organising design options through the seven themes defined in the project proposal and combining them into scenario-based configurations, delivarable

4.1 presents a set of preliminary guidelines that reflect both best practices and context-specific considerations identified in earlier work packages. These scenarios illustrate how different combinations of ecosystem services, temporal frameworks, geographical targeting, financial arrangements, control systems, programme types, and promotion mechanisms influence the feasibility and sustainability of PES schemes. The stakeholder workshop further contributes to this step by testing the relevance and practicality of these configurations, allowing key design elements to be validated and refined. Building on this foundation, the subsequent deliverable (D 4.2) will translate the validated scenarios and insights into more detailed guidance, supporting Member States in designing PES schemes that are coherent with EU policy frameworks and adaptable to different institutional and environmental contexts.

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8. Appendix

Appendix A. Workshop invitation and registration materials

1 - Save the date email

[Email title] Personal invitation: LIFE ProForPES Final Workshop,26 March 2026 | Vienna

Dear [Name],

We're pleased to personally invite you to the Final Workshop of the LIFE ProForPES Project "Towards the Integration of PES into EU Funding Frameworks." The event will take place at BOKU University, Vienna, on March 26, 2026, and will run throughout the day.
Organised by the European Forest Institute (EFI) and Etifor | Valuing Nature, and hosted by BOKU University, this exclusive workshop will bring together leading experts and key stakeholders from across Europe to discuss, validate, and co-design the future of Payments for Forest Ecosystem Services within EU funding frameworks. We will have the honour of welcoming Dr. Sven Wunder, an internationally recognized expert on Payments for Ecosystem Services, who will contribute his extensive experience and insights to the discussion.
Participation is by invitation only and free of charge*. At this stage, we kindly ask you to simply reply to this email with "I am interested" to let us know you wish to be kept updated. This will allow us to send you the official invitation and full agenda as soon as they are available.

You can find the Save the Date invitation (PDF format) attached. This is a confidential pre-invitation; we kindly ask not to share it externally. If you believe another person or organization should be considered for participation, contact us at info@lifeproforpes.eu

*Kindly note that participants are responsible for arranging and covering their own travel and accommodation expenses. Further information on lifeproforpes.eu/final-workshop

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Interested in our research progress?
Download the newly published deliverable "Gaps and potential for the integration of PES within the EU policies and financial framework" from our website's publications section.

Want to stay updated on our latest news?
Subscribe to our LinkedIn Newsletter and join a community of 2,800+ readers.

2 - Follow up email

Dear [Name],

We are writing to kindly follow up on our previous message regarding the Final Workshop of the LIFE ProForPES Project.

We would like to inform you that the **official registration will open by the end of December**. At this stage, we are only collecting expressions of interest to help us curate a balanced group of relevant stakeholders. A draft agenda will also be available by then.

If you wish to remain in the loop and receive the official invitation once registration opens, you can simply **reply to this email with "I am interested."** If we don't hear from you, we may open remaining spots to others.

Should you have any questions in the meantime, please feel free to contact us.

3 - Interested people email

Dear [Name] ,
Thank you for your kind expression of interest.

We will keep you informed about the agenda and the next steps leading up to the event. Should you wish to suggest another person or organisation whose participation could add value to the discussion, please feel free to let us know.

4 - People suggested by other people

Dear [Name] ,

Your contact was kindly shared with us by [Name], and it is a pleasure to reach out to you. [...]

5 - People that want to join online

Dear [Name] ,

Thank you for your kind expression of interest.

The event is designed as an in-person occasion for participatory activities and networking. We will keep you updated should any video material be produced and made available online after the workshop.

We wish you a pleasant day.

6 - Registration email

[Email title] Invitation to register | LIFE ProForPES Final Workshop, 26 March 2026 | Vienna

Dear [Name],

Following our previous exchange, we are pleased to invite you to **register for the Final Workshop of the LIFE ProForPES Project**, entitled *"Towards the integration of Payments for Ecosystem Services (PES) into EU funding frameworks".* The workshop will take place on **26 March 2026** at **BOKU University in Vienna** and will be held **in person** as a full-day participatory event. The day will start at **9:30 with a welcome coffee** and will include a **light lunch**.

The workshop is designed to bring together a **selected group of policymakers, practitioners, researchers, and stakeholders** to discuss, validate, and further refine the project's key findings and recommendations on the integration of PES schemes into EU policies.

To **register and consult the draft agenda**, please follow the instructions available on the Eventbrite page: https://ProForPES-Final-Workshop.eventbrite.it

The event is **by invitation only**, and places are limited to approximately **40 participants** to ensure meaningful interaction and exchange. We would be delighted to conclude the day with a **networking aperitivo** and kindly invite you to let us know if you will be able to join.

More logistical details will be shared with registered participants. Should you have any questions in the meantime, please feel free to contact us at **info@lifeproforpes.eu**.

Thank you for your interest in our project!
Kindest regards

7 - Confirmation email

Dear Participant,

Thank you for registering for the Final Workshop of the LIFE ProForPES Project, which will take place on 26 March 2026 at BOKU University in Vienna. We are pleased to confirm that your registration has been successfully received and that you are considered among the confirmed participants of the event.

In the coming months, you will receive updates about the programme via Eventbrite. To ensure you receive all communications, we kindly ask you to save the following email address in your contacts: info@lifeproforpes.eu

In the meantime, we recommend that you start checking availability and booking your travel and accommodation for the duration of the event, as prices may increase closer to the event date.

As the workshop is by invitation only and participation is limited, we kindly ask you to inform us as soon as possible should your plans change and you are no longer able to attend. This will allow us to offer the opportunity to other interested participants.

Should you have any questions in the meantime, please do not hesitate to contact us.

Kind regards,
The LIFE ProForPES Team

8 - Travel pack email

[Email title] Travel Information & Logistics | LIFE ProForPES Final Workshop, 26 March | Vienna

Dear [Name],

We are looking forward to welcoming you to the **LIFE ProForPES Final Workshop** at BOKU University in Vienna on 26 March 2026.

To assist you with your planning, we have prepared a **Travel Pack** document (attached) which includes information about:

- **Venue details:** Maps and directions to BOKU University.
- **Public transport:** Recommended routes from the airport and main train stations.
- **Accommodation:** A list of nearby hotels with varying price points.

We would like to highlight a specific option at the **Living Hotel Kaiser Franz Joseph**: by entering **BOKU26** in the "Corporate Code" section of their website reservation form, you can access a preferred rate that includes breakfast and flexible cancellation. Please ensure you select the **Kaiser Franz Joseph** location, as there are two Living Hotels in the city.

A quick note on attendance: As this is an invitation-only event with limited seating (approx. 40 participants), we want to ensure every spot is utilized. **If your plans have changed and you are no longer able to join us, please let us know as soon as possible.** This will allow us to offer your place to a colleague from our waiting list.

You can find out more about the agenda of the event through the site:
https://ProForPES-Final-Workshop.eventbrite.it

Should you have any questions regarding your stay in Vienna, please feel free to reach out to us at info@lifeproforpes.eu.

Safe travels, and see you in March!

Kind regards,

The LIFE ProForPES Team

9 - Invitation Follow up + Deadline

[Email title] Action Required: Final Call for Registration | LIFE ProForPES Final Workshop, 26 March | Vienna

Dear [Name],

Following our previous exchange regarding the **LIFE ProForPES Final Workshop** in Vienna (26 March 2026), we noticed that you haven't had the chance to complete your registration yet.

As mentioned, this workshop is a highly curated event designed for a small group of experts to co-design the future of Payments for Forest Ecosystem Services (PES). Because we are nearing our maximum capacity, we would like to confirm your participation by **4 February 2026**.

As places are limited, seats will be filled on **a first-come, first-served basis.** Once we reach our maximum capacity, registration will be closed.

How to Register: You can secure your place and view the latest agenda via our Eventbrite page: [Link: https://ProForPES-Final-Workshop.eventbrite.it]

We truly value your insights and hope you can join us to discuss, validate, and co-design the future of Payments for Forest Ecosystem Services within EU funding frameworks.

Best regards,

The LIFE ProForPES Team

10 - Warm up message

If your plans have changed and you are no longer able to join us, please let us know as soon as possible.

11 - Registration email (2) Recent recommendations

[Email title] Invitation to register | LIFE ProForPES Final Workshop, 26 March 2026 | Vienna

Dear [Name],

We are pleased to personally invite you to **register for the Final Workshop of the LIFE ProForPES Project**, entitled *"Towards the integration of Payments for Ecosystem Services (PES) into EU funding frameworks".* The workshop will take place on **26 March 2026** at **BOKU University in Vienna** and will be held **in person** as a full-day participatory event. The day will start at **9:30 with a welcome coffee** and will include a **light lunch**.

The workshop is designed to bring together a **selected group of policymakers, practitioners, researchers, and stakeholders** to discuss, validate, and further refine the project's key findings and recommendations on the integration of PES schemes into EU policies.

To **register and consult the draft agenda**, please follow the instructions available on the Eventbrite page: https://ProForPES-Final-Workshop.eventbrite.it

The event is **by invitation only**, and places are limited to approximately **40 participants** to ensure meaningful interaction and exchange. We would be delighted to conclude the day with a **networking aperitivo** and kindly invite you to let us know if you will be able to join.

More logistical details will be shared with registered participants. Should you have any questions in the meantime, please feel free to contact us at **info@lifeproforpes.eu**.

Thank you for your interest in our project!
Kindest regards

10 - Follow up email to cold contacts

[Email title] Final Call | LIFE ProForPES Final Workshop, 26 March 2026 | Vienna

Dear ,

We would like to follow up on our previous invitations regarding the **LIFE ProForPES Final Workshop** taking place on **26 March** at BOKU University in Vienna.

As we finalize the participant list, we are keen to ensure your perspective is represented. We are gathering a small, curated group of experts to provide actionable recommendations on integrating Payments for Ecosystem Services (PES) into EU funding frameworks.

By joining us in Vienna, you will have the opportunity to **directly influence the project's final policy recommendations to the EU**, ensuring they reflect the practical realities and challenges faced by practitioners and stakeholders. Beyond the working sessions, the day is designed to facilitate high-level networking in an intimate setting, allowing for meaningful exchanges. You will also gain early access to our key findings as we bridge the gap between local PES implementation and European policy.

Event Details:

- **When:** 26 March 2026 | 09:30 – 17:00 (followed by a networking aperitivo)
- **Where:** BOKU University, Vienna
- **Registration:** **https://ProForPES-Final-Workshop.eventbrite.it**

Because we have limited seats to ensure meaningful discussion, we would appreciate it if you could confirm your attendance by **15 February 2026**.

Once your registration is confirmed, we will send you a comprehensive guide with travel and logistical information, which includes exclusive discount codes for nearby hotels to help facilitate your stay in Vienna.

If you are unable to attend but believe a colleague would be a better fit for this discussion, please feel free to let us know.

We hope to see you in Vienna!

The ProForPES Team

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Please note that participants are responsible for arranging and covering their own travel and accommodation expenses. Further information is available at lifeproforpes.eu/final-workshop

11 - Invitation Mail to Recommended Contacts

[Email title] Invitation to register | LIFE ProForPES Final Workshop, 26 March 2026 | Vienna

Dear,

On behalf of Dr. Rik De Vreese, we are pleased to invite you to the final workshop of the **LIFE ProForPES project**: *"Towards the integration of Payments for Ecosystem Services (PES) into EU funding frameworks."*

We are keen to ensure your perspective is represented as we are gathering a small, curated group of experts to provide actionable recommendations on integrating PES into EU funding frameworks.

By joining us in Vienna, you will have the opportunity to **directly influence the project's final policy recommendations to the EU**, ensuring they reflect the practical realities and challenges faced by practitioners and stakeholders. Beyond the working sessions, the day is designed to facilitate high-level networking in an intimate setting, allowing for meaningful exchanges. You will also gain early access to our key findings as we bridge the gap between local PES implementation and European policy.

Event Details:

- **When:** 26 March 2026 | 09:30 – 17:00 (followed by a networking aperitivo)
- **Where:** BOKU University, Vienna
- **Registration:** **https://ProForPES-Final-Workshop.eventbrite.it**

Because we have limited seats to ensure meaningful discussion, we would appreciate it if you could confirm your attendance by **26 February 2026**.

Once your registration is confirmed, we will send you a comprehensive guide with travel and logistical information, which includes exclusive discount codes for nearby hotels to help facilitate your stay in Vienna.

If you are unable to attend but believe a colleague would be a better fit for this discussion, please feel free to let us know.

We hope to see you in Vienna!

The ProForPES Team

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Please note that participants are responsible for arranging and covering their own travel and accommodation expenses. Further information is available at lifeproforpes.eu/final-workshop

Appendix B. Participant briefing materials

Towards the integration of PES into EU funding frameworks

Final Workshop of LIFE ProForPES Project

26 March 2026, Wien, BOKU University
(University of Natural Resources and Life Sciences)

Briefing Pack

Main contents

1. The LIFE ProForPES project

The **LIFE ProForPES** (Promoting effective forest PES through EU financial and state aid programmes) project, co-funded by the European Commission's LIFE Programme and implemented between 2023 and 2026, aims to collect, synthesise and integrate the knowledge and practical experience on Payment for Ecosystem Services (PES) and PES-like schemes across the EU-27.

The project investigates the **readiness and opportunities to integrate PES mechanisms within EU financial programmes** and the state aid framework through an in-depth institutional analysis of existing gaps and potentialities. By analysing current EU policy and financing instruments and engaging in a structured consultation process with key stakeholders, ProForPES generates

evidence-based policy and business recommendations to support the development of effective PES schemes. **This is why your participation is essential.**

The **ProForPES final workshop** will focus on engaging stakeholders in a discussion on the key enabling conditions needed to better integrate PES into EU financing frameworks. The goal is to formulate concrete, evidence-based recommendations that can inform and support the work of the European Commission.

This work responds to the growing policy shift promoted by the **European Green Deal** and the **EU Forest Strategy for 2030** toward recognising and rewarding the multifunctionality of forests. While ecosystem services such as carbon sequestration, water regulation and biodiversity conservation generate significant societal value, the financial mechanisms capable of rewarding them remain fragmented or underutilised. By addressing this gap, the project contributes to strengthening sustainable forest ecosystem service provision in Europe and supports the achievement of the EU Biodiversity Strategy targets.

Within this **briefing pack**, you will find an overview of the steps that have led us to the final workshop. It begins with the methodology used to analyse the current state of PES in Europe, followed by an assessment of existing EU funding schemes and the potential gaps that may limit the integration of PES. It then presents the development of **scenarios** exploring how PES could be integrated into these financing mechanisms. **These scenarios play a central role in the workshop activities.** They will allow you to explore how, based on our analysis, we envision the future integration of PES into EU financing frameworks and will serve as the foundation for developing the final recommendations. **Chapter 3** of this briefing pack provides a dedicated overview of these scenarios.

Enjoy the reading!

2. ProForPES deliverables

This is our "Roadmap for Action". Based on all our research, we have developed a set of initial strategies to weave PES into the very fabric of EU policy, presented in our outputs. Some options presented below can serve as a good starting point for our workshop discussions, helping us decide which paths are most viable for a greener European future. We highly recommend you check them out in advance if you have the chance.

2.1. Methodology & baseline analysis

- **Research Framework & Methodology:** this deliverable establishes the standardized protocols used for data collection and analysis throughout the project. It ensures that diverse case studies across Europe are evaluated through a consistent scientific lens, allowing for comparable results and evidence-based policy recommendations. Download here

- **European PES Landscape Assessment:** a comprehensive inventory and analysis of existing PES and PES-related mechanisms currently operating in Europe. This report identifies the geographical distribution, ecosystem focus (e.g., carbon, water, biodiversity), and the specific financial structures used to incentivize sustainable land management. Download here

- **SWOT Analysis of European PES:** a strategic evaluation of the Strengths, Weaknesses, Opportunities, and Threats PES implementation faces in the EU. This report identifies the internal success factors of current schemes and the external barriers, such as market volatility or regulatory hurdles, that must be addressed to ensure long-term sustainability of an initiative. Download here

2.2. Regulatory & Financial Integration

- **EU Financial Framework Integration:** an analysis focused on the alignment of PES with existing EU financial instruments (such as the Common Agricultural Policy (CAP) and Cohesion Funds). This report identifies current funding gaps and provides recommendations on how PES can be better integrated into the EU's broader investment strategy for nature-based solutions. Download here

- **EU State Aid & Legal Compatibility:** this report examines the legal intersection between PES payments and EU State Aid regulations. It identifies potential legal conflicts where environmental payments might be classified as market distortions and proposes pathways to ensure PES schemes remain legally robust and compliant with competition law. Soon Online

- **Policy Integration Options:** a synthesis of preliminary strategic options for embedding PES mechanisms into future EU framework programs. This document transitions from research to action, providing a set of prioritized policy recommendations designed to influence the next generation of EU environmental and economic directives. Soon Online

3. Participatory activity: assessment of PES scenarios

In this workshop activity, participants will review **seven alternative PES scenarios** and assess their feasibility within the current and future EU framework, with the discussion contributing to a final recommendation.

The scenarios are **structured design configurations that allow alternative PES models to be compared in a clear and consistent way**. This reflects a central insight from PES design: scheme performance depends not on one feature alone, but on how core design choices fit together in practice, including targeting, contract design, monitoring, funding, and transaction costs. To support this comparison, all scenarios are organised around the same **seven design themes**, selected because they capture the main choices that shape how PES schemes work in practice:

- **Forest ecosystem services targeted** refer to the specific ecosystem service or benefit the scheme is intended to support, such as biodiversity, water regulation, carbon storage, or recreation.
- The **temporal framework** refers to the duration and timing of the scheme, including how long commitments and payments last and over what period results are expected.
- **Geographical scope** refers to the spatial area or scale at which the scheme is applied, whether this is a specific site, a catchment, a priority zone, or a wider landscape.
- The **financial framework** refers to how the scheme is funded and how financial responsibilities are shared among public and private actors.
- **Implementation control systems (MRV)** refer to the way actions, conditions, or results are monitored, reported, and verified so that payments can be linked to credible delivery.

- The **payment design** refers to the way payments are structured, for example whether they are based on actions, results, or a combination of both.
- The **promotion and facilitation mechanisms** within the financial programme refer to the supporting arrangements built into the scheme to enable participation and implementation in practice.

3.1. Your role in the activity

The purpose of this activity is to **use the scenarios as discussion tools**. Your assessment of their feasibility, risks, barriers, and enabling conditions is an important input to the next stage of the work. **Your discussion will help identify which combinations of design themes appear most credible, workable, and relevant in practice**, and will directly support the refinement of future recommendations.

3.2. Table of structure used to select recommended options

The table below summarises these seven design themes and the main categories of options considered under each. The narratives that follow show how these themes can be combined into different PES configurations.

Design Theme	Possible recommended options categories
Forest ecosystem services targeted	Single service vs bundled services; provisioning, regulating, cultural services
Temporal framework	Short-term pilots, medium contracts, long-term commitments
Geographical scope	Uniform national schemes, targeted areas, functional landscapes
Financial framework	EU public funding, national/state aid, private funding, mixed models
Implementation control systems (MRV)	Results-only monitoring, practice compliance, remote sensing, modelling
Type of payment design	Action-based, results-based, hybrid, collective schemes
Promotion and facilitation mechanisms	Information campaigns, advisory support, intermediaries, regulatory integration, coordination

3.3. Scenario narratives

The short narratives below provide a concise overview of what each scenario is intended to capture. They summarise the main logic and design features of each PES configuration, but do not present all underlying assumptions or technical details. Further explanation and context will be provided during the workshop discussion.

Scenario 1: Paying for better forest biodiversity through the Common Agricultural Policy

In many managed forests, owners face a practical trade-off: retaining habitat trees, deadwood and mixed-age structure strengthens biodiversity and resilience, but can reduce short-term revenue or increase operational constraints. These benefits are widely shared yet rarely reflected in market income, so the incentive to maintain high-quality habitat conditions is often weak.

This scenario uses the European Union Common Agricultural Policy to close that gap. Under the CAP strategic plan interventions (where legally applicable and designed by Member States), public funding can support annual or multi-annual payments to forest owners for maintaining biodiversity-friendly habitat conditions. The idea is simple: if forest managers deliver public-good habitat quality, society pays through existing CAP governance and payment structures rather than creating a new instrument from scratch, adapted to national eligibility rules and implementation choices.

Instead of demanding expensive species surveys, the scheme verifies habitat quality conditions that managers can influence within the contract period: deadwood volume, habitat trees, microhabitats such as cavities, and structural diversity. Monitoring combines remote sensing (to screen for structural patterns and disturbance signals) with targeted on-site checks to confirm features that satellites cannot detect. Payments are conditional on verified compliance with a hybrid design that can include a performance bonus for higher habitat-quality thresholds without making owners responsible for outcomes they cannot control.

What a sustainable PES model looks like: measurable improvement in habitat-condition indicators in priority biodiversity zones (e.g. Natura 2000), increased uptake of biodiversity-relevant practices, and a scalable model of biodiversity payments delivered through CAP structures.

Scenario 2: Paying for watershed protection through basin-Scale forest management

In many river basin, downstream towns repeatedly face muddy water after storms, higher treatment costs, and degraded streams. The causes are spread across the catchment: erosion-prone slopes, compacted soils, altered drainage, and land management decisions that accelerate runoff. No single landowner “causes” the problem, and no single intervention solves it—this is a basin-scale challenge.

This scenario builds a watershed-scale PES model within public river-basin governance. The goal is to reduce sediment and nutrient loads and stabilise flows through better land and forest management in targeted sub-basins. Because water outcomes are influenced by weather variability and time lags, the scheme is not designed as a strict results-only contract. Instead, it uses a hybrid design: pay for verified upstream measures known to reduce risk (for example, riparian buffers, erosion control practices, forest cover maintenance, soil-protecting management), and interpret water monitoring through modelling and multi-year trends.

Funding is a mix: public funding supports basin objectives and coordination, while downstream beneficiaries(e.g. utilities)can co-finance where cost savings are plausible. Monitoring combines compliance checks with water-quality and hydrological indicators (e.g., turbidity and nutrient concentrations, flow variability/retention effects) at abstraction points or downstream control stations, supported by model-based interpretation to avoid penalising land managers for storm-driven spikes outside contract control.

What a sustainable PES model looks like: sustained adoption of protective practices in priority sub-basins, improved multi-year trends in key indicators, and a durable governance and financing model that links upstream prevention to measurable improvements downstream at the river-basin scale.

Scenario 3: Paying for verified forest carbon removals

Across Europe, land managers are increasingly asked to contribute to climate mitigation through actions such as afforestation, restoring degraded forests, or rewetting peatlands. These actions can deliver long-term carbon storage, but they also involve upfront costs and long time horizons, and the climate value depends on whether removals are credible, additional, and durable.

This scenario set up a“high-integrity carbon” PES modelanchored in certified carbon removals under the European Union Carbon Removals and Carbon Farming certification framework (CRCF). The objective is to generate removals that are transparent and verifiable by addressing additionality (benefits beyond business-as-usual), credible baselines, and permanence (managing reversal risk from fire, pests, or management change). Because benefits accrue over time, the payment mechanism is hybrid: milestone or establishment support helps cover upfront costs, while results-based payments are linked to verified net removals and durable storage over time, with buffer arrangements to address non-permanence risk.

Funding follows a public–private logic. Public climate finance can provide an anchor and reduce early-stage risk, while private demand for certified removals can co-finance payments as methodologies and market confidence mature. Monitoring combines project documentation, remote sensing and field data with third-party verification and long-term follow-up, so payments remain conditional on verified performance rather than assumptions

What a sustainable PES model looks like: credible projects that are investable and verifiable, removals that withstand scrutiny, and a model that scales without sacrificing environmental integrity or public trust.

Scenario 4: Paying for climate resilience and forest wildfire risk reduction

In many regions, hot, dry summer means a single ignition can escalate into a fast-moving wildfire under extreme conditions. The problem is not that fires exist, but increasingly continuous and fuel-rich landscapes, often combined with high exposure where communities and infrastructure sit close to flammable vegetation. In such conditions, suppression alone is not sufficient; prevention and resilience become decisive.

This scenario pays for preventive forest and landscape management that reduces wildfire spread potential. The key is fairness: landowners cannot control lightning, arson, or heatwaves, so the scheme does not pay for "no fires." Instead, it pays for verifiable actions and conditions that reduce hazard: fuel reduction, maintained fuel breaks, strategic mosaics, and vegetation structures that slow spread and reduce intensity.

Funding is primarily public because the benefits are widely shared: fewer disasters, protected infrastructure, safer communities, and reduced emergency costs. Optional European Union co-financing can support pilots or scaling through climate adaptation funding. Monitoring focuses on fuel- and structure-related indicators and verified maintenance, supported by remote sensing and targeted site inspections.

What a sustainable PES model looks like: hazard indicators reduced in high-risk zones (especially wildland–urban interface areas), preventive treatments maintained over time, and a shift from reactive suppression spending toward proactive, measurable risk reduction.

Scenario 5: Paying for urban cooling and well-being through urban and peri-urban forests

In many cities, dense neighbourhoods experience severe heat stress during heatwaves: hard surfaces store heat, nights cool slowly, and indoor temperatures can remain dangerously high, especially for vulnerable residents. Urban trees and forests can reduce local heat exposure and support well-being, but these benefits depend on long-term canopy health, safety, and access. In practice, the main constraint is often not planting, but sustained maintenance and management.

This scenario establishes an urban PES model focused on local cooling and well-being. The scheme pays for ongoing management and maintenance of urban and peri-urban forests, watering, pruning, safety, replacement planting, and maintaining access, because this is where many cities face a chronic funding gap.

Funding follows a public–private logic. European Union cohesion and urban funding can provide capital support for establishing or upgrading green infrastructure, while municipal budgets finance ongoing management and maintenance. Monitoring focuses on locally

attributable service delivery, combining canopy cover and vegetation condition indicators, neighbourhood heat-exposure measures, accessibility and use indicators, and on-site verification of maintenance actions. Air-quality metrics can be included only where local attribution is plausible (e.g., roadside corridors), but they are not the main payment trigger

What a sustainable PES model looks like: maintained canopy where it matters most, measurable reduction in local heat exposure, improved access for vulnerable residents, and a practical model that converts greening projects into sustained public services.

Scenario 6: Paying for bundled forest ecosystem services at landscape scale

In many forest landscapes, biodiversity, water regulation, and carbon storage rise or fall together. A change in forest structure might improve habitat and water retention while also influencing carbon stocks. But if programmes pay for each service separately, landowners face fragmented incentives, trade-offs go unmanaged, and the landscape never adds up to a coherent result.

This scenario contracts multiple primary services together at the landscape scale: habitat and gene pool protection, hydrological regulation and water purification, and global climate regulation through carbon storage. It is built for functionally defined landscapes where ecological effectiveness depends on coordination across many parcels (e.g., large Natura 2000 complexes, forested watersheds/sub-basins, mountain regions, cross-border forest landscapes)´.The scheme is hybrid and collective: action-based payments support coordinated management measures, complemented by results-based bonuses linked to agreed landscape-scale indicators, with distribution rules agreed among participants.

Funding follows a public–private logic: public funding provides the baseline for coordination and participation (including support for intermediary/coordinating bodies and technical assistance), while service-specific co-financing can be layered where beneficiaries exist (for example, utilities for water benefits, certified carbon buyers for climate benefits). Monitoring avoids a single “one-number” score; instead, it uses service-specific indicators supported by remote sensing and on-site verification, aggregated into landscape reporting so conditionality remains clear, and trade-offs are visible.

What a sustainable PES model looks like: coordinated actions that produce real landscape-scale outcomes, lower transaction costs through group participation, and a workable template for multi-objective delivery where single-parcel approaches are insufficient.

Scenario 7: Paying for drinking water source protection through utility-led PES
In many drinking-water systems, worsening raw water quality—higher turbidity and sediment after storms, elevated nutrients, or pesticide traces—raises treatment complexity, costs, and operational risk. Protecting water at source can be more cost-effective and durable than relying only on downstream treatment, but it requires sustained upstream land-management measures. This scenario is a utility-led PES model for source protection with one anchor payer. The utility (or drinking-water provider) acts as the primary payer, using regulated tariffs or service charges, because it directly benefits from better raw water conditions. Land managers upstream are paid to maintain protective conditions: forest cover, riparian buffers, erosion control, reduced chemical inputs where relevant, and practices that stabilise runoff. Because water indicators can be noisy, the scheme is hybrid. It pays mainly for verified actions and compliance, and uses results-based components only where attribution is plausible (for example, at targeted monitoring points interpreted with modelling). Funding is public–private: utility revenues are primary, complemented by targeted public co-funding for restoration and monitoring capacity where broader public benefits apply. Monitoring verifies the agreed measures and tracks key raw-water indicators at abstraction points, supported by upstream sampling, remote sensing of land cover and buffer integrity, and modelling to interpret trends and external influences. What a sustainable PES model looks like: stable long-term contracts in defined source catchments, reduced treatment pressures over time, fewer water-quality risk events, and a prevention-focused public service model that is financially durable and governance-compatible.

4. Glossary

Term	Short description (close to source wording / standard usage)	Link
CAP (Common Agricultural Policy)	The CAP is the EU policy framework for agriculture and rural areas; in 2023–2027, Member States implement it through CAP Strategic Plans with flexibility to adapt measures to national/local needs.	https://agriculture.ec.europa.eu/cap-my-country_en
CAP Strategic Plans / interventions	CAP Strategic Plans set out the intervention strategy and instruments each Member State uses to achieve CAP objectives in 2023–2027.	https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans_en

Natura 2000	An EU-wide network of protected areas aimed at ensuring the long-term survival of Europe's most valuable and threatened species and habitat types.	https://environment.ec.europa.eu/topics/nature-and-biodiversity/natura-2000_en
CICES (Common International Classification of Ecosystem Services)	A classification framework used to identify and compare ecosystem services (including Regulation & Maintenance services such as habitat/gene pool protection, hydrological regulation, and climate regulation).	https://cices.eu/
MRV (Monitoring, Reporting, Verification)	A system for monitoring activities/results, reporting data, and verifying compliance or claims; used in PES/carbon schemes to support conditionality and credibility. *(General standard usage; CRCF uses monitoring/reporting/certification/verification language.)*	CRCF overview: https://climate.ec.europa.eu/eu-action/carbon-removals-and-carbon-farming_en
Copernicus / Earth Observation (EO)	Copernicus is the Earth observation component of the EU Space Programme, providing environmental monitoring data and services.	https://www.copernicus.eu/en
Action-based payment	Payment linked to implementation/maintenance of agreed management actions or conditions (e.g., buffers, fuel breaks, habitat trees), rather than only final outcomes. *(PES design term.)*	
Results-based payment	Payment linked to measured/verified outcomes or indicators (e.g., verified removals, ecological indicators), subject to monitoring feasibility and attribution. *(PES design term.)*	
CRCF (Carbon Removals and Carbon Farming Certification Framework)	The CRCF Regulation established the first EU-wide voluntary certification framework for permanent carbon removals, carbon farming, and carbon storage in products.	https://climate.ec.europa.eu/eu-action/carbon-removals-and-carbon-farming_en

Risk buffer / pooled reserve (carbon)	A safeguard mechanism (buffer reserve / risk-pooling) used to manage reversal/non-permanence risk in carbon projects and protect scheme credibility.	
River basin / catchment / sub-basin	Hydrological units used for water management: a basin/catchment drains to a river system; a sub-basin is a smaller hydrological unit within it.	WFD overview: https://environment.ec.europa.eu/topics/water/water-framework-directive_en
WFD (Water Framework Directive)	EU water policy framework based on River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs) to protect/restore water bodies, reach good status, and prevent deterioration.	https://environment.ec.europa.eu/topics/water/water-framework-directive_en
RBMP (River Basin Management Plan)	The river-basin planning instrument under the WFD, used with Programmes of Measures to organise water protection/restoration actions.	https://environment.ec.europa.eu/topics/water/water-framework-directive_en
DWD (recast Drinking Water Directive)	The recast EU Drinking Water Directive includes updated standards and a preventive, risk-based approach that favours action to reduce pollution at source.	https://environment.ec.europa.eu/topics/water/drinking-water_en
Source water / source-catchment protection	Protection of catchment areas upstream of abstraction points to reduce raw-water pollution risks and support safe drinking-water supply.	
Riparian buffer	Vegetated buffer strips along watercourses used to reduce erosion/sediment/nutrient transfer and support bank stability and water protection. *(Standard land/water management term.)*	
WUI (Wildland–Urban Interface)	Areas where settlements and flammable vegetation meet/intermix; often a priority zone for wildfire prevention and risk reduction.	

Fuel break	A managed strip/zone where vegetation fuels are reduced to slow fire spread and support wildfire suppression/prevention strategy. *(Standard wildfire management term.)*	

Appendix C. Scenario posters

Co-funded by the European Union

SCENARIO 1

Paying for better forest biodiversity through the Common Agricultural Policy (CAP)

Scenario 1 represents the most policy-compatible and potentially scalable pathway where legal eligibility and national design permit for integrating forest biodiversity PES into existing EU funding structures.

Why this scenario?

Scenario 1 addresses a core and urgent policy challenge in European forests: biodiversity decline, while using the most scalable and administratively established EU funding route currently available across the European Union: CAP Pillar I eco-schemes.

Biodiversity in forests is a classic public good, with broad societal benefits but weak private market demand, making publicly financed PES the most realistic large-scale solution. By embedding **habitat-focused payments within the existing CAP architecture**, this scenario combines ecological priority with institutional feasibility, avoiding the need for a new instrument while ensuring EU-wide reach. It reflects both project evidence and European practice, which show that **action-based** or **hybrid biodiversity schemes** are more operationally viable at scale than purely results-based approaches.

Theme	Reccomended option
1. FORESTRY ECOSYSTEM SERVICES TARGETED	Biodiversity: Maintaining and enhancing habitats and gene pool protection *(CICES: Regulation & Maintenance → Lifecycle maintenance, habitat and gene pool protection).*
2. TEMPORAL FRAMEWORK	Medium-term commitments (5–7 years) aligned with CAP programming cycles, with periodic review and adjustment of compliance and ecological progress (e.g. every 1–2 years).
3. GEOGRAPHICAL SCOPE	Designated conservation areas and priority biodiversity zones (e.g. Natura 2000 sites and nationally mapped biodiversity hotspots) with management requirements tailored to regional ecological conditions.
4. FINANCIAL MECHANISM	Public: EU public funding only for CAP strategic plan interventions (e.g. eco-schemes under Pillar I), providing annual or multi-annual payments for biodiversity-enhancing forest management practices.
5. IMPLEMENTATION CONTROL SYSTEMS	Habitat-quality indicators (deadwood volume, age structure, habitat features (tree cavities, microhabitats), structural diversity index), measured through remote sensing (canopy cover patterns, gaps/structural complexity proxies, disturbance history) and on-site verification (deadwood volume, set-aside habitat trees, followed by management restrictions) and administrative checks using CAP monitoring systems.
6. TYPE OF FINANCIAL PROGRAMME	Hybrid: action-based funding + result-based ecological performance bonus, implemented through CAP Eco-scheme instrument.
7. PROMOTION AND FACILITATION MECHANISMS WITHIN FINANCIAL PROGRAMME	Integration into CAP Strategic Plans, supported by European Commission policy guidance combined with Member State implementation tools (e.g., scoring systems, administrative procedures), advisory services, intermediary support, and collective/coordinated participation options, to ensure coherent delivery.

**CICES: Common International Classification of Ecosystem Services*

Who benefits?

Forest owners / land managers: predictable payments for biodiversity-friendly forest management, with manageable entry conditions.

Member States / managing authorities: progress toward biodiversity targets using existing Common Agricultural Policy mechanisms.

Environmental authorities: measurable habitat improvements using accepted indicators.

Citizen/Society: more resilient, diverse forests and associated ecosystem co-benefits.

Expected outcomes

Policy outcomes: measurable improvement in habitat-condition indicators in targeted priority areas; increased uptake of biodiversity-relevant practices within CAP Strategic Plans; improved coherence and comparability of biodiversity delivery across participating regions.

Implementation outcomes: functioning hybrid payment model at scale (action core + performance bonus) with feasible monitoring (remote sensing + checks), demonstrating an operational PES logic within CAP.

Environmental outcomes: increased deadwood retention, habitat trees, structural diversity and stand heterogeneity; strengthened ecological condition and resilience over time in priority zones.

Socio-economic outcomes: improved acceptance of biodiversity-oriented payments among forest owners via predictable support and clear compliance rules.

Project partners

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SCENARIO 2

Paying for watershed protection through basin-scale forest management

Scenario 2 was chosen because it provides a credible and policy-compatible model for basin-scale forest PES that aligns ecological logic, governance structures, and financing feasibility within existing water management frameworks.

Why this scenario?

Scenario 2 was selected because it addresses a structurally important but hydrologically complex policy challenge: improving water quality and flow regulation at watershed scale through upstream forest management.

Unlike source-specific utility models, this scenario reflects a **basin-wide public-good logic aligned with river basin governance frameworks**, where sediment control, nutrient retention and flood-risk mitigation are collective regional objectives. Because these benefits accrue to multiple downstream users and public authorities, a publicly anchored PES model with potential co-financing from utilities or basin actors is institutionally coherent and economically justified.

This scenario is also consistent with European experience, where **watershed-related PES mechanisms** are **among the most mature and durable PES configurations**, particularly when embedded in river basin planning and supported by actors with stable revenue streams. At the same time, the design acknowledges the well-documented attribution challenges in hydrological systems and therefore avoids relying on strict results-only payment structures.

Theme	Reccomended option
1. FORESTRY ECOSYSTEM SERVICES TARGETED	Regulation of water quality and flow through forest management *(CICES: Regulation & Maintenance → Hydrological cycle regulation and water purification).*
2. TEMPORAL FRAMEWORK	Long-term contracts (10–20 years) aligned with river basin management planning cycles under the Water Framework Directive (WFD).
3. GEOGRAPHICAL SCOPE	Upstream forest areas within high-risk river basins with sediment, nutrient, or flow-regulation pressures (including, but not limited to, drinking-water relevance), including transboundary catchments where coordination is needed.
4. FINANCIAL MECHANISM	Public-private: National or regional State aid schemes + Co-financing from water utilities through regulated tariffs or water charges.
5. IMPLEMENTATION CONTROL SYSTEMS	Water quality measurements (e.g. turbidity, nutrient concentrations) + Hydrological indicators (e.g. flow variability, retention effects) + Monitoring at water abstraction points or downstream control stations + Model-supported interpretation of upstream management effects.
6. TYPE OF FINANCIAL PROGRAMME	Hybrid: Action-based payments for agreed management practices + result-based bonus/component informed by monitoring and modelling.
7. PROMOTION AND FACILITATION MECHANISMS WITHIN FINANCIAL PROGRAMME	Incorporation into regional and cohesion funding programmes through: Priority axes for nature-based water protection measures + Incentives for participation of upstream land managers + Facilitation of partnerships between utilities and landowners.

Who benefits?

Forest owners/land managers: long-term payments for watershed protection measures.

Regional and basin authorities: improved water regulation, sediment control, and flood-risk mitigation.

Water users / downstream communities: improved water quality and reduced flood-related risks.

Public programmes/infrastructure operators: lower long-term costs from erosion, sedimentation, and hydrological instability.

Expected outcomes

Policy outcomes: basin-level progress on WFD pressures (sediment, nutrients, hydromorphological stress) through targeted upstream interventions; stronger integration of PES-style contracts into basin planning instruments.

Implementation outcomes: workable hybrid design that uses monitoring and modelling to interpret "noisy" water indicators; improved coordination among multiple land managers and payers.

Environmental outcomes: reduced erosion risk, improved infiltration and buffer function, reduced peak runoff in treated sub-basins, improved long-term trends in key water-quality indicators (interpreted over multi-year windows).

Socio-economic outcomes: reduced long-term treatment/sedimentation costs where prevention is effective; increased resilience of water services under climate variability.

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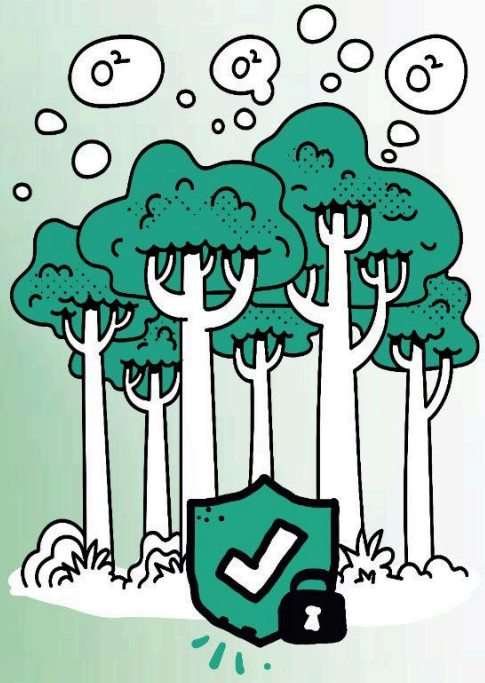
SCENARIO 3

Paying for verified forest carbon removals

Scenario 3 was chosen because it provides a high-integrity, policy-compatible pathway for integrating forest carbon PES into emerging European certification and climate-accounting frameworks, without compromising environmental credibility for the sake of rapid market growth.



Why this scenario?

Scenario 3 was selected because it addresses a central and strategically sensitive policy challenge in European climate governance: how to scale forest-based carbon removals in a way that is credible, additional, and durable.

As the European Union moves toward climate neutrality, **increasing removals in the land sector** has become a clear policy objective, yet forest carbon schemes face persistent concerns regarding baselines, additionality, permanence, and monitoring integrity. In the European context, where forest area and carbon stocks have already been increasing in many regions, **establishing credible baselines** beyond expected business-as-usual trends is particularly critical. For this reason, the scenario is anchored in a **certification-based, policy-aligned framework** rather than relying on loosely regulated voluntary market expansion.

This scenario also reflects project evidence (D2.2/D2.3) showing that **carbon-focused PES mechanisms are expanding but continue to struggle with trust, risk allocation, and long-term credibility**. By prioritising robust monitoring, permanence safeguards, and risk-buffer mechanisms, the design responds directly to these integrity challenges while allowing a structured mix of public and private financing.

Theme	Reccomended option
1. FORESTRY ECOSYSTEM SERVICES TARGETED	Climate regulation through long-term carbon sequestration and storage *(CICES: Regulation & Maintenance → Global climate regulation by reduction of greenhouse gas concentrations).*
2. TEMPORAL FRAMEWORK	Long-term permanence commitments (20–50 years) with periodic verification of carbon storage and risk management over time.
3. GEOGRAPHICAL SCOPE	European Union-wide application, with region-specific mitigation practices reflecting ecological conditions and land-use suitability.
4. FINANCIAL MECHANISM	Public+private: European Union climate instrument (Innovation Fund) + compliance/market demand from emissions trading system actors purchasing certified removals (compliance or regulated buyers include operators of energy-intensive digital-asset activities) + risk buffer reserve for non-permanence (e.g., pooled buffer credits).
5. IMPLEMENTATION CONTROL SYSTEMS	Carbon accounting and verification aligned with the Carbon Removal Certification Framework, including: Standardised carbon accounting consistent with land-use reporting systems + Biomass estimation using remote sensing and ground data + Risk management mechanisms (e.g. buffer pools for reversals).
6. TYPE OF FINANCIAL PROGRAMME	Hybrid: Upfront or milestone-based payments to cover establishment and restoration costs + Results-based payments linked to verified tonnes of carbon dioxide removed and stored.
7. PROMOTION AND FACILITATION MECHANISMS WITHIN FINANCIAL PROGRAMME	Promotion through carbon-related funding instruments by: Recognition of certified carbon removals (CRCF) as eligible climate investments + Financial instruments facilitating upfront investment (e.g. loans or guarantees from European investment institutions) + Guidance for participation of regulated emitters and voluntary buyers.

Who benefits?

Forest owners/land managers: long-term income from verified carbon removals and storage.

Private buyers / regulated emitters: access to certified, high-integrity carbon removals.

European Union and Member State climate policy: additional removals aligned with climate targets and accounting systems.

Citizen/society: lower net greenhouse gas emissions and more climate-resilient landscapes.

Expected outcomes

Policy outcomes: increased deployment of certified removal activities consistent with emerging EU certification requirements; improved integrity/credibility of forest carbon claims through baseline-setting, verification, and permanence safeguards.

Implementation outcomes: demonstration of a financing structure that overcomes long timelines (upfront/milestone + results-based payments) and manages reversal risk (buffers/risk pooling).

Environmental outcomes: verified net carbon storage improvements beyond business-as-usual baselines (where robustly defined), plus resilience-oriented practices that reduce reversal risk.

Socio-economic outcomes: strengthened trust and transparency through registries, third-party verification, and standardised methodologies.

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SCENARIO 4

Paying for climate resilience and forest wildfire risk reduction

Scenario 4 was chosen because it demonstrates how PES can support prevention-oriented, climate-resilience forest management in fire-prone landscapes through a realistic, policy-compatible payment and monitoring framework.

Why this scenario?

Scenario 4 was selected because wildfire risk has become an increasingly urgent and structural climate-adaptation challenge in European forest landscapes, particularly in high-hazard regions and wildland–urban interface zones.

Wildfire risk reduction is fundamentally a public-good function: benefits such as reduced damage to communities and infrastructure, lower suppression and recovery costs, and improved landscape resilience are widely shared, while private incentives for preventive management are often insufficient.
This makes a publicly financed PES approach a realistic and policy-relevant option for scaling preventive action. By design, the scenario focuses on **verifiable risk-reduction conditions** (fuel structure, continuity, and maintained preventive measures) rather than event-based outcomes such as "fires avoided," which are strongly influenced by weather and external factors beyond the control of individual land managers.

Theme	Reccomended option
1. FORESTRY ECOSYSTEM SERVICES TARGETED	Regulation of disturbance impacts through reduction of wildfire spread potential *(CICES: Regulation & Maintenance → Mediation of extreme events).*
2. TEMPORAL FRAMEWORK	Medium-term commitments (5–10 years), with periodic review of compliance and landscape risk conditions.
3. GEOGRAPHICAL SCOPE	Regions with high wildfire hazard, particularly wildland–urban interface (WUI) zones and areas identified through national fire risk assessments.
4. FINANCIAL MECHANISM	Public (state aid): National or regional public programmes for risk prevention and climate adaptation, potentially complemented by EU co-financing instruments (e.g. Pillar II measures + LIFE adaptation grants).
5. IMPLEMENTATION CONTROL SYSTEMS	Verification based on implementation of strategic preventive measures and landscape conditions, including: Assessment of fuel reduction in priority locations (e.g. firebreak zones, buffers near settlements, high-risk spread pathways) + Verification of compliance with approved fuel management plans + Remote sensing to monitor vegetation density and land-cover changes + Confirmation of timing of interventions relative to fire season. + On-site verification of implemented measures + Use of fire risk assessment tools (e.g. waldbrand.at) where available
6. TYPE OF FINANCIAL PROGRAMME	Action-based, with risk-reduction performance bonuses, rewarding implementation and maintenance of preventive measures that reduce fire spread potential rather than fire
7. PROMOTION AND FACILITATION MECHANISMS WITHIN FINANCIAL PROGRAMME	Incorporation into public funding schemes through: dedicated funding windows for preventive landscape management + incentives for coordinated participation across neighbouring land managers + support for collective applications where landscape-scale action is required + alignment with national wildfire risk management strategies

Who benefits?

Forest owners/land managers: long-term income from verified carbon removals and storage.

Local communities (especially in high-risk areas): reduced wildfire spread risk and lower exposure to damage.

Public authorities / civil protection systems: lower long-term suppression and recovery costs.

Infrastructure operators and local economies: reduced disruption and damage risk in fire-prone regions.

Expected outcomes

Policy outcomes: measurable reduction in hazard indicators in targeted zones; improved alignment of forest management incentives with EU resilience/prevention framing.

Implementation outcomes: workable scheme that avoids unfair "fire outcome" conditionality by paying for verifiable risk-reduction actions and condition-based bonuses (not "no-fire" results).

Environmental outcomes: reduced fuel continuity and hazardous biomass accumulation; more fire-resilient landscape structures and strategic treated areas maintained over time.

Socio-economic outcomes: reduced long-term public costs from extreme fire events (suppression, recovery, infrastructure losses) where prevention is sustained and well targeted.

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SCENARIO 5

Paying for urban cooling and well-being through urban and peri-urban forests

Scenario 5 was chosen because it demonstrates how PES-style maintenance contracts can complement urban investment programmes and strengthen the long-term delivery of cooling and well-being services in cities and peri-urban areas.

Why this scenario?

Scenario 5 was selected because it addresses a rapidly growing European policy challenge: urban heat exposure and unequal access to high-quality green space, with direct implications for climate adaptation, health, and social equity.

This scenario captures a **distinct PES integration pathway** in the overall set because it links forest and green infrastructure management to urban climate and well-being objectives, rather than to biodiversity conservation, watershed protection, carbon removals, or wildfire prevention. In the European context, this is particularly relevant because cities increasingly need not only capital investment in green infrastructure, but also durable financing for its long-term management and maintenance in places where **climate vulnerability and social need** are most concentrated. By focusing on locally experienced and policy-relevant benefits such as cooling, accessibility, and well-being, the scenario reflects a **practical and governance-compatible pathway** for testing how PES-style approaches can support urban and peri-urban forest management.

Theme	Reccomended option
1. FORESTRY ECOSYSTEM SERVICES TARGETED	Local climate regulation with co-benefit physical/psychological well-being enabled by urban green infrastructure. (CICES: Regulation & Maintenance → Micro- and local climate regulation, air quality regulation where local attribution is plausible; and Cultural → Physical and experiential interactions with the environment).
2. TEMPORAL FRAMEWORK	Medium-term delivery window aligned with EU urban programming periods (e.g. 2026–2032) with ongoing annual management contracts.
3. GEOGRAPHICAL SCOPE	Urban and peri-urban forests and green corridors, with priority for heatstress hotspots (biophysical targeting) + Neighbourhoods with higher vulnerability (socio-economic targeting).
4. FINANCIAL MECHANISM	Public–private: European Union cohesion/urban funding as capital support + municipal budgets for ongoing management + developer contributions/ planning-related levies (where available under national or municipal rules) earmarked for green infrastructure and maintenance.
5. IMPLEMENTATION CONTROL SYSTEMS	Verification focused on high-attribution, low-noise indicators combining: Canopy cover and vegetation condition (remote sensing + on-site verification) + Accessibility and use indicators (e.g. proximity, access points, maintenance standards; optional visitor counts) + On-site verification of management and maintenance action . (Air-quality indicators may be included only where monitoring is localised, and attribution is plausible (e.g. roadside corridors), and treated as contextual evidence rather than a primary payment trigger.)
6. TYPE OF FINANCIAL PROGRAMME	Action-based, providing payments for ongoing management and maintenance of urban and peri-urban forests, complementing capital funding for green infrastructure establishment where relevant.
7. PROMOTION AND FACILITATION MECHANISMS WITHIN FINANCIAL PROGRAMME	Alignment with Sustainable Urban Development strategies supported under cohesion policy + Integration into municipal climate adaptation, health, and urban resilience plans + Dissemination of guidance, case studies, and tools through European urban policy networks and partnerships (e.g. Greening Cities Partnership, European Urban Initiative, ESPON, ICLEI) + Capacity-building and knowledge exchange supporting cities in designing and implementing PES-style maintenance contracts.

Who benefits?

Urban residents (especially in vulnerable neighbourhoods): cooler environments, improved access to green space, and health/well-being benefits.

Municipalities / urban authorities: support for climate adaptation and public health objectives.

Peri-urban forest owners/land managers: compensation for ongoing management that provides public urban benefits.

Public health systems / local services: reduced heat-related stress and improved urban liveability.

Expected outcomes

Policy outcomes: improved delivery of urban climate adaptation objectives with measurable neighbourhood-scale indicators (heat exposure, canopy condition, accessibility); better equity targeting in vulnerable areas.

Implementation outcomes: a PES-compatible model that separates capital investment from long-term maintenance payments; control system combining ecological condition plus human-benefit indicators, supported where possible by existing urban monitoring.

Environmental outcomes: maintained or increased canopy cover in priority zones; improved vegetation condition and survivability; sustained cooling performance where interventions are concentrated.

Socio-economic outcomes: improved access to well-maintained green areas; stronger local resilience during heatwaves; clearer accountability for long-term maintenance performance.

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SCENARIO 6

Paying for bundled forest ecosystem services at landscape scale

Scenario 6 was chosen because it provides a policy-compatible model for bundled, landscape-scale forest PES in contexts where coordinated management is necessary to achieve meaningful ecological outcomes.

Why this scenario?

Scenario 6 was selected because it addresses a structural limitation in many forest PES designs: the fragmentation of ecosystem services and management across landscapes where biodiversity, water regulation, and carbon storage are ecologically interdependent.

In many European forest contexts, **fragmented ownership and parcel-based contracting** reduce ecological effectiveness, particularly where services such as habitat connectivity, watershed protection, and landscape-scale carbon storage depend on coordinated action across multiple properties. A single-service approach is often insufficient in such settings. This scenario was retained because evidence and workshop discussions consistently highlighted the need for **more integrated, place-based PES configurations** that can contract multiple primary ecosystem services jointly rather than treating one service as dominant and the others as incidental co-benefits. By **structuring payments at the landscape scale** and supporting collective participation mechanisms, the design seeks to overcome coordination barriers while maintaining service-specific accountability.

Theme	Reccomended option
1. FORESTRY ECOSYSTEM SERVICES TARGETED	Bundled primary services: habitat and gene pool protection + hydrological cycle regulation and water purification + global climate regulation *(CICES: Regulation & Maintenance → lifecycle maintenance and habitat protection; hydrological cycle regulation, global climate regulation).*
2. TEMPORAL FRAMEWORK	Medium-term (5–10-year) landscape contracts, with periodic review and adaptive management provisions.
3. GEOGRAPHICAL SCOPE	Functionally defined forested landscapes where coordinated management influences multiple services, such as: Large Natura 2000 complexes + Mountain regions + Forested watersheds or river sub-basins + Cross-border forest landscapes.
4. FINANCIAL MECHANISM	Public–private: (EU and national public fund) Rural development cooperation instrument (CAP Pillar II / community-led approaches) as baseline + service-specific co-financing by identifiable beneficiaries (e.g., utilities, carbon buyers, tourism stakeholders) where applicable.
5. IMPLEMENTATION CONTROL SYSTEMS	Service-specific monitoring combined at landscape scale: ES Indicators (e.g. habitat condition, watershed indicators, carbon metrics) + Remote sensing for land-cover and structural changes + On-site verification of agreed management actions across participating land units + Aggregated reporting of outcomes for programme accountability.
6. TYPE OF FINANCIAL PROGRAMME	Hybrid (collective): action-based payments for coordinated management measures + results-based bonuses linked to landscape-scale service indicators, while payments are distributed to participants based on agreed rules.
7. PROMOTION AND FACILITATION MECHANISMS WITHIN FINANCIAL PROGRAMME	Support for landscape-scale coordination: Funding for intermediary organisations or coordinating bodies + Technical assistance for collective planning and applications + Simplified procedures for group participation + Incentives for cooperation among neighbouring land managers.

Who benefits?

Forest owners and other land managers participating collectively: access to payments that depend on coordination and landscape scale.

Local and regional authorities: more efficient delivery of biodiversity, watershed, and climate objectives through integrated management.

Identifiable service beneficiaries (where applicable): e.g., water utilities, carbon buyers, tourism actors benefiting from improved landscape functions.

Rural communities and landscapes: stronger cooperation, reduced fragmentation, and improved multifunctionality.

Expected outcomes

Policy outcomes: demonstrable multi-objective delivery in selected functional landscapes; stronger coherence across biodiversity, water and climate policy goals where services are interdependent.

Implementation outcomes: workable hybrid design that uses monitoring and modelling to interpret "noisy" water indicators; improved coordination among multiple land managers and payers.

Environmental outcomes: reduced erosion risk, improved infiltration and buffer function, reduced peak runoff in treated sub-basins, improved long-term trends in key water-quality indicators (interpreted over multi-year windows).

Socio-economic outcomes: reduced long-term treatment/sedimentation costs where prevention is effective; increased resilience of water services under climate variability.

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SCENARIO 7

Paying for drinking water source protection through utility-led PES

Scenario 7 was chosen because it illustrates a targeted and governance-compatible utility-led PES pathway for drinking-water source protection, one of the most policy-relevant and potentially durable PES configurations in the European context when carefully designed.

Why this scenario?

Scenario 7 was selected because it addresses a clearly identifiable, operational policy challenge: securing long-term drinking-water quality at its source through upstream land management. While it shares a hydrological focus with Scenario 2, it is conceptually and institutionally distinct.

Scenario 7 is anchored in **specific source catchments** linked to defined drinking-water systems, where a **clearly identifiable beneficiary - the water utility** - has direct financial and regulatory incentives to invest in upstream protection measures.
Project discussions and earlier findings highlighted that utilities across Europe face rising treatment complexity, compliance pressures, and long-term supply risks, while **preventive catchment management** can often be more cost-effective and durable than relying solely on downstream treatment technologies. This creates a strong and economically grounded **"beneficiary pays"** logic. In this scenario, utilities are not peripheral co-funders but structured anchor payers within a formalised PES arrangement, complemented by public support where broader public-good elements are involved.

Theme	Reccomended option
1. FORESTRY ECOSYSTEM SERVICES TARGETED	Watershed protection for drinking-water supply enabled by forest cover, low-input management, erosion control, and riparian buffering. *(CICES: Regulation & Maintenance → Regulation of the chemical condition of freshwaters (water quality regulation).*
2. TEMPORAL FRAMEWORK	Long-term contracts (10–30 years) aligned with drinking-water infrastructure planning and utility asset cycles, with periodic compliance and performance reviews.
3. GEOGRAPHICAL SCOPE	Upstream source catchments supplying major drinking-water systems, including protected abstraction zones.
4. FINANCIAL MECHANISM	Public–private: utility tariffs/service charges as primary funding + targeted public co-funding for restoration and monitoring capacity (EU or national programmes (Interreg/LIFE).
5. IMPLEMENTATION CONTROL SYSTEMS	Compliance monitoring of agreed land-management measures combined with targeted water-quality indicators (Nitrate and pesticide concentrations at abstraction points, Turbidity and sediment load indicators) + Periodic upstream sampling at representative locations + Remote sensing to verify land cover and buffer integrity + Hydrological or water-quality modelling to interpret trends and external influences.
6. TYPE OF FINANCIAL PROGRAMME	Hybrid: Action-based payments for agreed watershed protection measures + results-based components linked to raw water quality outcomes at abstraction points where attribution is feasible.
7. PROMOTION AND FACILITATION MECHANISMS WITHIN FINANCIAL PROGRAMME	Integration into drinking-water source protection planning and regulatory frameworks (primarily the recast Drinking Water Directive risk-based approach, with WFD coordination where relevant) + Utility–landowner coordination mechanisms and advisory support + Technical guidance on watershed protection measures + Model long-term contract structures to reduce transaction costs + Capacity support for monitoring and data management.

Who benefits?

Water utilities / drinking-water providers: lower treatment costs, reduced operational risk, and more secure raw water quality.

Forest owners/land managers: stable long-term payments for source protection measures that may otherwise reduce income from timber production.

Citizens/society: safer drinking water supply and greater resilience of public water services.

Public authorities: progress on source protection and water policy objectives, reduced environmental risks to critical infrastructure, and co-benefits for other reservoir functions where applicable, supported through targeted co-funding rather than full public financing.

Expected outcomes

Policy outcomes: improved preventive source-protection outcomes in designated catchments; clearer operational linkages between land management contracts and drinking-water risk management frameworks.

Implementation outcomes: a realistic hybrid contract model combining action-based payments with results-based components only where attribution is plausible; improved trust via monitoring plus modelling interpretation of "noisy" indicators.

Environmental outcomes: reduced erosion and pollutant risk in source catchments; strengthened riparian function and buffer integrity; improved multi-year trends in key raw-water risk indicators (interpreted with context).

Socio-economic outcomes: reduced long-term treatment and risk-management costs; improved reliability of public water services and reduced vulnerability to contamination episodes.

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Appendix D. Questions and actions

Scenario 1: Paying for Better Forest Biodiversity through the CAP.

A. Core questions linked to the actions above

A) Scenario logic validation

1. **Does integrating forest biodiversity payments into CAP eco-schemes provide a realistic and scalable pathway for supporting biodiversity-friendly forest management across Member States?**
   (What opportunities or limits do you see based on experience?)

B) Recommended options validation

2. **Are short-term contracts (5–7 years) aligned with CAP programming cycles realistic and acceptable from a policy and budget perspective?**
   (Would CAP authorities and forest owners find the hybrid payment design administratively workable and attractive enough to join?)

3. **Is targeting Natura 2000 sites and priority biodiversity zones an effective way to prioritise CAP funding for biodiversity-related PES?**

   (Could this create gaps for high-biodiversity forests outside mapped zones, and how should that be managed?)

C) Feasibility assessment

4. **Are the proposed monitoring and control approaches (habitat-condition indicators supported by remote sensing and targeted field checks) proportionate and robust enough to justify public spending under CAP rules?**
   (What feels feasible, and what may be challenging?)

D) Enabling conditions and adjustments

5. **What policy or administrative adjustments would be needed at EU or Member State level to enable forest biodiversity PES to be effectively integrated into CAP eco-schemes?** *(For example: clearer guidance, simplified indicators, capacity building, or phased implementation.)*

B. Core policy and public-authority actions

1. **Embed forest biodiversity PES in CAP Strategic Plans:** Define forest-appropriate biodiversity payment options within national CAP Strategic Plans (e.g., eco-schemes under Pillar I, where applicable).

2. **Define the paid service and eligible management measures:** Specify habitat and gene pool protection as the service basis, and define eligible measures (habitat trees, deadwood retention thresholds, structural diversity practices, set-asides)..

3. **Target payments to priority biodiversity areas:** Prioritise Natura 2000 sites and nationally mapped biodiversity hotspots to maximise ecological additionality.

4. **Set medium-term contract durations aligned with forest management:** Use 5–7-year commitments aligned with CAP cycles, with structured review points (e.g., every 1–2 years) for compliance and progress.
5. **Approve proportionate monitoring and control systems:** approve habitat-quality indicators (e.g., deadwood, habitat trees, structural diversity) supported by remote sensing and targeted field checks, integrated into CAP monitoring systems.

6. **Provide enabling tools and guidance for implementation:** ensure advisory services, implementing guidance, and administrative tools (scoring, procedures) are funded and operational.

Scenario 2: Paying for watershed protection through basin-Scale forest management

A. Core discussion questions

A)Scenario logic validation

1. **Does a basin-level PES approach make sense as a policy tool to address water quality and hydrological regulation in addition to existing regulatory measures?**
   (Where does PES add value, and where might it duplicate existing tools?)

B) Recommended options validation

2. **Are long-term contracts aligned with Water Framework Directive (WFD) planning cycles realistic and acceptable from a policy and budget perspective?** *(Can authorities commit funding over 10–20 years, and how should review points be structured to maintain flexibility?)*

3. **Is targeting high-risk basins and transboundary basins where coordination is required an effective way to prioritise public funding for water-related PES?** *(In cross-border basins, who should coordinate and how can responsibilities and benefits be shared fairly across jurisdictions?)*

C) Feasibility assessment

4. **Is the proposed monitoring approach (combining water-quality indicators, hydrological indicators, and modelling-based interpretation of upstream measures) sufficiently robust for public policy use?**
   (What conditions are needed to make this work? (data availability, baselines, verification capacity))

D) Enabling conditions and adjustments

5. **What governance arrangements or institutional partnerships would be needed to enable effective cooperation between basin authorities and upstream land managers?**
   (For example: clearer legal frameworks, coordination capacity, data access, or stakeholder engagement mechanisms.)

B. Core policy and public-authority actions

1. **Integrate PES into river basin governance, targeting improving water regulation services:**
   Embed watershed PES contracts within river basin management planning and programmes of measures, focusing on upstream forest management contributions.

2. **Set contract duration aligned with basin planning cycles:** Adopt long-term agreements (10–20 years) consistent with Water Framework Directive planning and infrastructure horizons, with clear review points to maintain flexibility.

3. **Target priority catchments, including transboundary basins where coordination is required:** Prioritise basins with high pollution pressures, flood exposure, or drinking-water relevance, and include transboundary basins where upstream–downstream impacts span jurisdictions.

4. **Establish the funding package (public baseline + utility co-financing):** Use state-aid-compatible public water/basin programmes as the core funding source, and enable utility co-financing where direct operational benefits exist (e.g., reduced treatment and sedimentation risks).

5. **Approve robust but practical monitoring and control systems**: Use water-quality indicators (e.g. turbidity, nutrients) supported by **model-supported interpretation**, with monitoring oversight remaining with public authorities.

6. **Provide governance platforms and coordination mechanisms:** Support basin-level coordination structures (river basin authorities and formal coordination arrangements for cross-border basins) to manage contracting and stakeholder relations.

Scenario 3: Paying Forests for Verified Carbon Removals

A. Core discussion questions

A) Scenario logic validation

1. **Does using PES to support certified forest carbon removals provide a credible pathway for scaling land-sector climate mitigation in Europe?**
   (What opportunities and key risks do you see, especially for public authorities (integrity, costs, feasibility)?)

B) Recommended options validation

2. **Are long-duration commitments (20–50 years) realistic and acceptable from a policy and financing perspective for verified carbon removals?**
   (How can long-term obligations be handled when land ownership changes or disturbance risks increase?)

3. ***Is prioritising high-additionality activities (e.g., interventions with clear additionality and manageable permanence risk) and selected land types (e.g., drained peatlands/organic soils, degraded or understocked forests) an effective way to target support for carbon-removal PES?***
   (How can authorities avoid paying for business-as-usual carbon gains while still keeping participation attractive?)

C) Feasibility assessment

4. **Is the proposed monitoring/control system aligned with the Carbon Removal Certification Framework (CRCF, including remote sensing, biomass estimation, and third-party verification) feasible and proportionate for large-scale implementation?** *(What parts of MRV and certification feel most feasible, and what governance or market risks could limit implementation?)*

D) Enabling conditions and adjustments

5. **What financial and institutional conditions are needed to attract both public funding and private buyers to support certified forest carbon removal projects?** *(For example: clear methodologies, risk-sharing mechanisms, funding access, or long-term oversight capacity.)*

B. Core policy and public-authority actions

1. **Enable forest carbon PES aligned with EU carbon certification frameworks:** Establish PES schemes that reward verified carbon removals and storage in forests, aligned with the Carbon Removal Certification Framework (CRCF) and registry/verification requirements.
2. **Define eligible forest-based carbon activities:** Approve eligible practices (e.g., afforestation/reforestation, improved forest management, peatland rewetting/restoration) with clear baseline/additionality rules to avoid crediting business-as-usual carbon gains.
3. **Set long-term contract durations to ensure permanence:** Define contracts with long time horizons (20–50 years), including rules for ownership change, reversal-risk management, and long-term oversight.
4. **Establish hybrid payment structure linked to certified removals:** Set payment upfront or milestone payments for establishment/restoration, with results-based payments for verified tonnes of CO_2 removed/stored over time.
5. **Ensure public oversight of monitoring and verification:** Maintain oversight of MRV through CRCF-aligned methodologies, remote sensing + ground data, and third-party verification/audits.

6. **Facilitate access to upfront finance and risk management tools:** Enable access to public finance instruments (e.g. Innovation Fund, EIB support) and de-risking tools (e.g., guarantees, aggregation support, technical assistance) to reduce entry barriers such as costs and long-term commitments..

Scenario 4: Paying for climate resilience and wildfire risk reduction

A. Core discussion questions

A) Scenario logic validation

1. **Does using PES to support preventive wildfire risk management in high-hazard regions and wildland–urban interface zones provide added value compared with existing forest management or fire-prevention policies?** *(Where does PES complement current tools, and where might it overlap with existing programmes?)*

B) Recommended options validation

2. **Are medium-term contracts (5–10 years) realistic and acceptable for publicly funded prevention programmes from a policy and budget perspective?**
   (How should contracts ensure maintenance of fuel treatments over time rather than one-off actions?)

3. ***Is targeting* high-hazard zones and wildland–urban interface areas an effective and fair *way to prioritise public funding for wildfire risk-reduction PES?***
   (Could targeting concentrate funding in some regions while leaving other fire-prone landscapes underserved, and how should priorities be set?)

C) Feasibility assessment

4. **Are the proposed monitoring indicators (focused on vegetation fuel load and hazard-reduction indicators rather than fire occurrence itself) appropriate and feasible for public payment schemes?** *(What feels feasible, and what may be challenging in practice (data availability, verification capacity, timing, cost)?)*

D) Enabling conditions and adjustments

5. **What institutional or financial mechanisms would be needed to support long-term preventive wildfire management through PES programmes?**
   (For example: clearer risk mapping, coordination capacity, or long-term funding stability.)

B. Core policy and public-authority actions

1. **Establish PES schemes targeting climate resilience and fire-risk reduction:** Create publicly funded PES measures that reward preventive actions, reducing wildfire spread potential and strengthening landscape resilience with optional EU co-financing where relevant.

2. **Define eligible preventive forest management activities:** Approve preventive actions such as fuel reduction, maintenance of fuel breaks and strategic treatment areas, vegetation structure management, and fire-resilient restoration measures, including, where appropriate, moisture/rewetting measures that reduce fire spread and severity.
3. **Set medium-term commitments with periodic review:** Use 5–10-year contracts with defined review points to ensure maintenance of treatments and adaptive management.
4. **Target PES high-hazard and wildland–urban interface (WUI) areas:** Focus implementation on hazard/risk-class zones and WUI areas using transparent risk mapping.
5. **Approve proportionate monitoring and hazard-reduction indicators:** Use indicators such as fuel continuity/fuel load proxies, vegetation structure metrics, treated-area maintenance checks, and remote sensing change detection, with public oversight—not fire occurrence as a payment trigger.
6. **Support coordination and delivery capacity:** Provide programme guidance, verification capacity, and coordination mechanisms; use EU co-financing (e.g., LIFE) where relevant, without making it a prerequisite

Scenario 5: Paying for urban cooling and well-being through urban and peri-urban forests

A. Core discussion questions

A) Scenario logic validation

1. **Does using PES for urban and peri-urban forest services add value to existing urban climate and health policies?**
   (Where does PES strengthen current approaches and where might it overlap with existing tools?)

B) Recommended options validation

2. **Are management-focused contracts realistic and acceptable from a municipal policy and budget perspective (compared with one-off investment funding)?**
   (What funding arrangements could ensure long-term maintenance is financed reliably after planting or capital projects end?)

3. **Is targeting heat hotspots and vulnerable neighbourhoods an effective way to prioritise public funding for urban cooling and well-being PES?**
   (How can cities define "priority" areas transparently and avoid political disputes over neighbourhood selection?)

C) Feasibility assessment

4. **Are the proposed monitoring approaches (based on local heat-exposure indicators, canopy condition, and accessibility/use indicators) sufficient to justify public benefits without creating excessive administrative burden?**
   (What feels proportionate and workable in practice, and what may be challenging (data, staffing, frequency)?)

D) Enabling conditions and adjustments

5. **What funding or governance arrangements would help cities secure long-term financing for management and maintenance of urban green infrastructure?**
   (For example: clearer mandates, coordination across departments, or stable maintenance funding.)

B. Core policy and public-authority actions

1. **Integrate urban/peri-urban forest PES into urban adaptation and health policy delivery:** Embed PES-style maintenance contracts within urban climate-adaptation and health strategies and relevant urban development plans.

2. **Define eligible ecosystem services and management actions:** Approve service objectives centered on local cooling/thermal comfort and accessible green space, and define eligible maintenance actions (watering, pruning, replacement, safety/access upkeep). Treat air-quality effects as contextual evidence only where local attribution is plausible.

3. **Establish contract structures that sustain long-term service delivery:** Use annual or multi-annual maintenance contracts with review points; align with funding windows where needed (e.g.,urban/cohesion programmes) but ensure continuity beyond one-off investment cycles..

4. **Combine EU and municipal funding in a maintenance-capable model:** Enable financing that supports capital investment where relevant, while securing stable municipal funding for ongoing management and maintenance; allow planning-related contributions where legally feasible..

5. **Approve high-attribution monitoring and verification:** Use neighbourhood-scale heat exposure indicators, canopy cover/condition metrics, accessibility indicators, optional use proxies, and on-site verification of maintenance actions; avoid reliance on city-wide averages as payment triggers..

6. **Ensure equitable access and targeting:** Prioritise heat hotspots and vulnerable neighbourhoods with transparent criteria to support equity and reduce political disputes.

Scenario 6: Paying for bundled forest ecosystem services at landscape scale

A. Core discussion questions

A) Scenario logic validation

1. **Does organising PES at the landscape scale through collective multi-benefit contracts offer clear advantages over single-benefit oriented schemes?**
   (*Where do you see the biggest gains (effectiveness, efficiency, governance), and where do you see risks or limits?)*

B) Recommended options validation

2. **Are 5–10-year collective agreements with periodic review realistic and acceptable from a policy and funding perspective for multi-service PES?**
   (How can authorities reduce transaction costs and prevent free-riding in collective participation models?)

3. **Is targeting functional landscapes (e.g., Natura2000 complexes, sub-basins, corridors) an effective way to prioritise funding to locations where bundled services and coordination add most value?**
   (Which landscape types are most suitable for integration, and what practical criteria should authorities use to select them?)

C) Feasibility assessment

4. **Is the proposed monitoring approach (combining service-specific indicators with landscape-scale reporting) feasible for programme accountability?** *(What feels feasible and robust, and what may be challenging in practice (data availability, verification capacity, avoiding double counting?)*

D) Enabling conditions and adjustments

5. **What institutional arrangements (e.g. intermediaries, collective contracts, or local coordination bodies) would be needed to support participation and coordination among land managers?** *(For example: legal clarity, coordination capacity, funding for intermediaries, simplified procedures, or proportionate monitoring rules.)*

B. Core policy and public-authority actions

1. **Enable collective, landscape-level PES contracts:** Create legal and administrative conditions allowing groups of land managers to participate jointly, including rules for participation, responsibilities, and payment distribution..

2. **Define governance and intermediary roles for landscape PES:** establish who is responsible for contracting, coordination, compliance, and reporting (lead authority, recognised group, or intermediary)..

3. **Allow coordinated use of multiple funding sources:** allow coordination of public baseline funding with service-specific co-financing (e.g., water users, carbon finance) under transparent accounting rules that avoid double funding for the same outcome

4. **Define the contracted bundle of primary services:** specify a limited bundle of primary services to be contracted jointly (e.g., biodiversity habitat protection + watershed regulation + climate regulation), without requiring a single “lead service..

5. **Approve collective hybrid payment structures:** allow base payments supporting coordinated management actions, plus results-linked components where indicators support accountability.

6. **Establish service-specific monitoring with landscape-level reporting:** use distinct indicators per service (biodiversity, water, carbon) with aggregated landscape reporting; avoid a single composite score that dilutes conditionality.

7. **Fund coordination and facilitation capacity:** Provide funding and formal recognition for intermediaries/coordinators supporting cooperation, applications, and administration..

Scenario 7: Paying for drinking water source protection through utility-led PES

A. Core discussion questions

A) Scenario logic validation

1. **Does a utility-led PES make sense as a policy approach for protecting drinking-water sources for securing long-term intake water quality?**
   (Where does this approach add value compared with existing source-protection and drinking-water safety tools?)

B) Recommended options validation

2. **Are long-term utility contracts (10–30 years) realistic and acceptable from a regulatory and public-service perspective?**
   (What regulatory safeguards are needed to ensure tariffs can support prevention investments while remaining socially acceptable?)

3. **Is targeting assigned source catchments and abstraction zones an effective way to prioritise utility-led funding for drinking-water protection PES?**
   (How should responsibilities be handled where reservoirs serve multiple public functions (e.g., drinking water, energy or flood regulation)?

C) Feasibility assessment

4. **Are the proposed water-quality monitoring approaches (combining abstraction-point water-quality indicators with upstream sampling and hydrological interpretation) sufficient and credible to justify long-term payments?**
   (What feels robust, and what may be challenging?)

D) Enabling conditions and adjustments

5. **What regulatory or financial conditions would help utilities invest in preventive catchment management instead of relying only on downstream water treatment?**
   (For example: legal clarity, tariff rules, coordination mechanisms, or stakeholder engagement.)

B. Core policy and public-authority actions

1. **Enable utility-led PES schemes for drinking-water source protection:** Establish legal/policy frameworks allowing utilities to finance upstream preventive measures through long-term contracts.

2. **Define priority source-water protection zones:** Designate source catchments/abstraction zones where forest cover, riparian buffers, and erosion/input risk reduction are critical.

3. **Align PES contracts with long-term utility planning cycles:** Set long-term contracts (10–30 years) aligned with utility asset and risk-management horizons, with review clauses.

4. **Allow blended financing with tariffs as the core:** Enable models where utility tariffs/service charges provide the primary funding, with targeted public co-funding for restoration, start-up, or monitoring where broader public benefits justify it.

5. **Approve robust monitoring and interpretation arrangements:** Use abstraction-point indicators (nutrients, pesticides, turbidity) **c**ombined with upstream sampling, remote sensing of land cover/buffer integrity, and hydrological interpretation/model support to manage noisy signals.

6. **Provide standardised guidance and contract templates:** Develop templates and guidance to reduce transaction costs and improve legal/administrative clarity for utilities and land managers.

Appendix E. Workshop agenda and facilitation design

E-1 Full workshop agenda

26 March 2026, Wien, BOKU University
(University of Natural Resources and Life Sciences)

Towards the integration of PES into EU funding frameworks

Final workshop of LIFE ProForPES Project

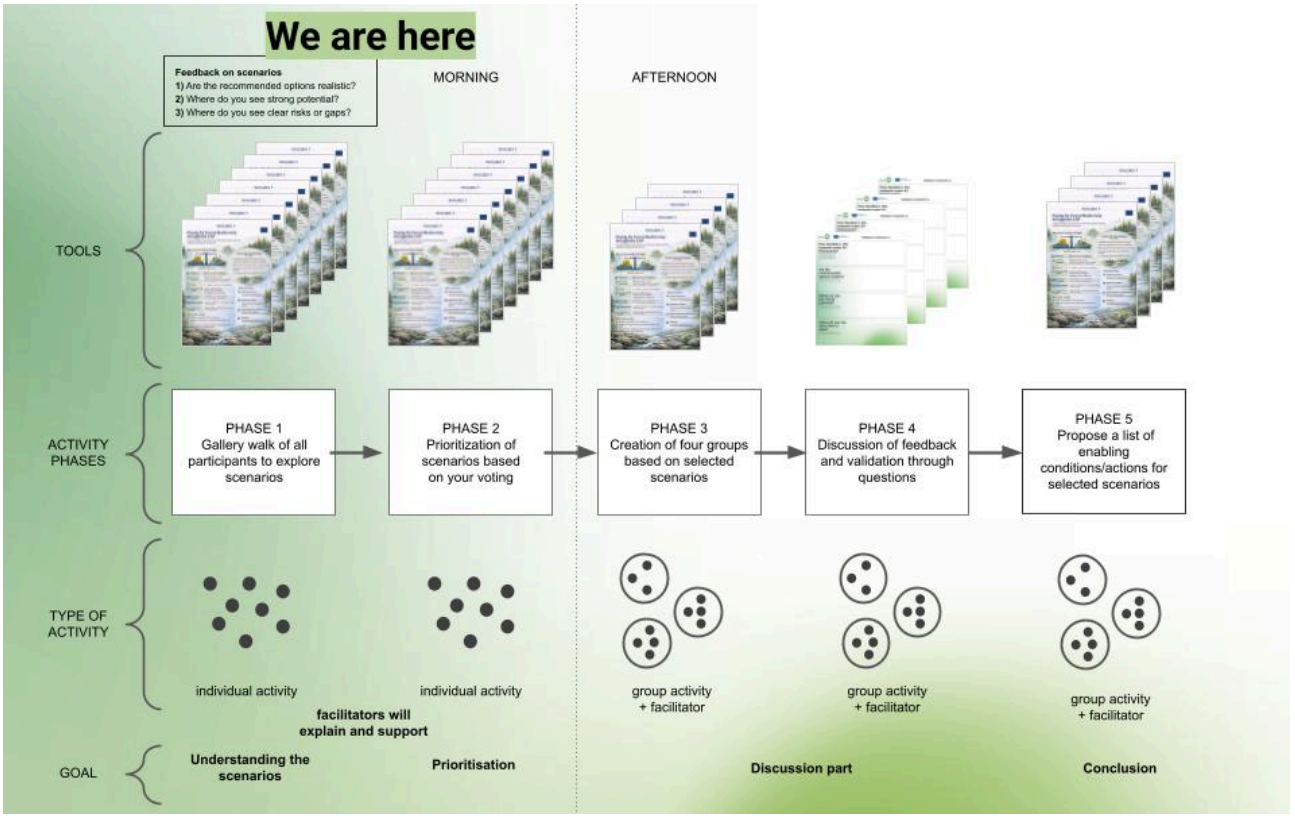
WORKSHOP AGENDA

09:30	Welcome	Registration of participants and welcome coffee
10:00	Introduction to the workshop	**Harald Vacik**, BOKU University **Paola Gatto**, University of Padova
10:15	Keynote session: Policy, academic and business perspectives on Payments for Ecosystem Services (PES)	Representative of the Austrian Federal Ministry of Agriculture, Forestry, Climate and Environmental Protection, Regions and Water Management
		Sven Wunder, Principal Scientist at European Forest Institute (EFI)
		Alessandro Leonardi, CEO at Etifor | Valuing Nature
11:00	Introduction to the ProForPES project	Overview of the project objectives, activities and the process that led to the development of PES scenarios and policy recommendations
12:00	Coffee break	
12:15	PARTICIPATORY ACTIVITY	Stakeholder engagement gallery walk on PES scenarios
13:00	Light lunch	
14:30	PARTICIPATORY ACTIVITY	Stakeholder breakout sessions on the assessment of selected PES scenarios
16:35	Wrap-up in plenary	Presentation and discussion of the main results from each group
16:55	Closing remarks	**Harald Vacik**, BOKU University **Paola Gatto**, University of Padova
17:00	Networking aperitivo and wine tasting with local producers	

Project partners

Co-funded by the European Union

E-2 Session formats (plenary, Gallery Walk, breakout groups)



- Group allocation and facilitation roles

Appendix F. Feedback framework

Towards the integration of PES into EU funding frameworks
Final Workshop of LIFE ProForPES Project
Vienna, 26 March 2026

Breakout room: _____ Scenario (1-7): _____ Facilitator: _____ Note taker: _____ Group representative:_____
Time: 14:40-16:20

Participants in the group

Name	Organisation	Role/perspective (policy/research/NGO/private/etc.)

Round 1 - Story sharing (35 minutes)

Participants share points that support or challenge the logic of the selected scenario. Main ideas raised:

Speaker	Context/example	Thinking about [this scenario] in your country/region, what is the biggest barrier to making it work in practice, and what is the most important enabling action a policy maker/public authority could take?	Key insight

Evidence mentioned (e.g., projects, policies, PES schemes, initiatives, research, cases):

- _____

Main messages emerging from the discussion:_____
_____
What seems to support the scenario:
_____

What challenges or contradicts it:_____
_____
New perspectives raised:_____

Round 2 - Actions & enabling conditions (45 min)

The facilitator presents the key policy actions proposed for the selected scenario. The discussion focuses on validating the scenario logic, assessing the proposed design options, testing feasibility, and identifying enabling conditions.

Discussion by key questions

A. Scenario logic validation (policy relevance)

Is this PES approach a credible and realistic policy option within the current EU policy and funding frameworks?

Main comments:_____
_____
Opportunities identified:_____
_____
Limits or concerns:_____
_____
B. Recommended options validation (design choices)

Do the proposed design options (e.g., payment structure, targeting, governance arrangements) strike a workable balance between administrative simplicity and ecological credibility?

Key comments:_____

Suggested improvements:
_____

C. Feasibility assessment

Are the proposed monitoring and implementation approaches proportionate and robust enough to justify public funding?

What seems feasible:_____
_____

What may be challenging/potential risks:_____
_____

D. Enabling conditions and adjustments

What is the most important adjustment or enabling condition needed for public authorities to implement this scenario successfully? Key enabling conditions mentioned:

a) legal clarity
b) simplified monitoring
c) capacity building
d) coordination mechanisms
e) funding stability
f) other:
_____

Notes:_____

Additional actions or improvements suggested

Key takeaways from the group:

- _____

Most important enabling condition:
_____

Most critical barrier:
_____

Wrap up

Message for the plenary (5 min presentation)

Scenario discussed:

KEY MESSAGE	
MAIN RECOMMENDATION	

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