Spurring INnovations for forest eCosystem sERvices in Europe

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D3.4 Synthesis of IA implementation report (Part II)

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Authors

Nathalie Pipart[1], Eirini Skrimizea[1], Alba Granados[1], Constanza Parra[1], Bart Muys[1]; Bo Jellesmark Thorsen[2], Thomas Hedemark Lundhede[2], Jeanne-Lazya Roux[3], Marko Lovrić[3], Georg Winkel[3], Giulia Amato[4], Martina Belović Kelemen[5], Andreas Bernasconi[6], Tanja Blindbæk Olsen[7], Giorgia Bottaro[8], Camille De Herdt[9], Ivona Đuričković[5], Christian Jürgensen[7], Martina Jurjević Varga[5], Anton Kataev[10], Bruno Locatelli[11], Natalia Lukina[10], Juhani Pyykkönen[12], Daria Tebenkova[10], Alexander Therry[9], Liisa Tyrväinen[13], Carlos Uriagereka[14], Enrico Vidale[15].

[1] KU Leuven
[2] University of Copenhagen
[3] European Forest Institute
[4] Etifor
[5] PINP Medvednica
[6] Pan Bern AG
[7] Danish Forest Association
[8] UniPD
[9] Natuurinvest, Flanders
[10] CEPF RAS
[11] CIRAD, University of Montpellier, and CIFOR
[12] The Finnish Forestry Centre
[13] LUKE
[14] Forest Service of Bizkaia
[15] Consorzio Comunalie Parmensi

Reference

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Executive summary

This Deliverable reports on:
i) the main results from the Innovation Actions (IAs) in terms of implementation and performance;
ii) the complete Sustainability Self-Assessment (SSA) of the Innovative Mechanisms (IMs) selected for implementation, including the methodological approach, the SSA outcomes, and the main findings on the sustainability of IAs/IMs;
iii) in-depth analysis of the SSA results for the IA Belgium/Flanders and IA Spain/Catalonia, both representative cases for the rest of the IAs;
iv) congruence with policy frameworks.

After a brief introduction (**Chapter 1**) and profile of each IA and IM (**Chapter 2**), **Chapter 3** presents the status of implementation in each IA case and the performance up to this point. As many are still under implementation, we relate performance to both the interest of stakeholders in the process of developing the IA, and the observed implementation as far as progressed. **Chapter 4** goes through the steps and findings of the SSA process presenting i) the overall approach to the IMs' sustainability assessment, ii) the sustainability aspects of the screening tool and main ex-ante SSA findings, iii) the framework used for the SSA protocol, and iv) the SSA tool and the ex-post SSA findings per IM. We describe the whole SSA process and we present an overview of the findings. We also provide an in-depth look at the SSA reports (ex-ante and ex-post results) of two IAs, Belgium/Flanders and Spain/Catalonia to offer a more fine-grained image of the way the IAs evolved in parallel to the evolution of the SINCERE project. **Chapter 5** assesses the policy needs of the IAs and aims to address the issue of whether current governance and policy mechanisms adequately support the provision of forest ES and related innovations.

Main conclusions (**Chapter 6**) per Work Package tasks (Implementation, SSA, congruence with policy frameworks) include:

i) Several IAs have reached the mature phase and secured the basis for enhanced ES provision now and particularly ahead, whereas a few IAs are still in the developing phase with on-the-ground impact yet to come;

ii) Most of the IAs have reported having reached a generally positive overall sustainability and the results of the assessment seem to match the main sustainability targets and expectations. At the same time, it is important to acknowledge that several sustainability impacts are expected to only manifest themselves after a longer time frame;

iii) All IAs conform to the relevant policies, however, policy and regulatory frameworks are often mentioned as constraining FES innovations. Better coordination of policies and improved policy and strategic support from top-level and national administrations to promote innovation models is seen as necessary.

Overall, all the tasks and the interaction with the practice partners brought to the foreground that the novelty of the FES approach, and more importantly of the principle of 'paying for the provision of FES' approach, is introducing a new evidence-based natural resource planning that is timely and relevant but also a challenge for the IAs. In this regard, this Deliverable illustrates that no 'one-fits-all' solution exists. Successful schemes have to come from an adaptation to the diversity of local perspectives and needs, a consideration of stakeholders' interests and a participative assessment of the institutional constraints and possibilities, while finding the right balance between conforming to the current institutional context and pushing for path-breakings and innovation.

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List of main abbreviations

IA	Innovation Action
IM	Innovative Mechanism
ES	Ecosystem Services
FES	Forest Ecosystem Services
CES	Cultural Ecosystem Services
PES	Payment for Ecosystem/Environmental Services
PCI	Principles-Criteria-Indicators framework
MAG	Regional Multi-Actor Group meetings
SSA	Sustainability Self-Assessment

Glossary

Forest Ecosystem Services (FES): the benefits humans obtain from forest ecosystems. These include provisioning services, such as timber, non-wood forest products and water; regulating services such as climate and water regulation; cultural services such as recreation, aesthetics and cultural heritage.

Innovation Actions (IA): activities conducted in the regional cases directly aimed at co-designing, co-testing, co-implementing and co-evaluating Innovative Mechanisms that support the provision of Forest Ecosystem Services.

Innovative Mechanisms (IM): novel policies, business models and other mechanisms, including Payments for Ecosystem/Environmental services, to support the provision of Forest Ecosystem Services.

Innovation Action cases (IA cases): the regional cases where IAs are developed and implemented. The terminology of implementation phases used in the SINCERE application spans from initial to early and, finally, mature stages. Initial IA cases are those in the diagnosis stage of the innovation cycle; in early stage, IMs have mostly been designed and are, partially, in the early phase of implementation; in mature IA cases, innovative mechanisms have been developed and are currently being implemented, but there is a necessity to re-assess performance and to further refine the IM. Given the heterogeneity of IAs in terms of e.g., depth of innovation, initial developments, framework conditions, and gain versus risk, this Deliverable introduces an additional phase termed 'developed' for those IA cases that are not mature yet but have still demonstrated significant progress (see chapter 3).

Innovation Action Screening tool (IA screening tool): an ex-ante assessment tool intended to support IA partners in assessing the feasibility and sustainability potential of the IA activities. The purpose of this screening tool is to contribute to the processes of identifying and designing each IA, and specifically, critically assessing the IMs that are considered as part of the IAs.

Payments for Ecosystem/Environmental Services (PES): Voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating off-site services (Wunder, 2015).

Regional Multi-Actor Group Meetings (MAG): a platform gathering a limited set of (mostly local) stakeholders with a firm interest in a specific IA case, who will participate in co-design, co-implementation, co-evaluation and co-learning related to this IA, and in the overall set of activities at the interfaces of the (practical) action, policy and (scientific) knowledge sphere throughout the duration of SINCERE.

Sustainability Self-Assessment (SSA): a comprehensive sustainability assessment of the IMs addressing their environmental, social, economic and institutional dimensions. The overall approach is essentially based on self-assessment by the IA practice partners with support from the research partners. The process includes an ex-ante sustainability assessment using a screening approach and the IA screening tool during the design stage, and an ex-post SSA using an optimisation approach and the SSA tool during the implementation stage.

Sustainability Self-Assessment tool (SSA tool): an ex-post assessment tool intended to support practice partners in assessing the sustainability of the IA activities in terms of ecological, social, institutional and economic aspects. The SSA tool was developed in co-design with SINCERE research and practice partners through a process freely inspired and adapted from the Delphi method. Practice parterns use the SSA tool to report the ex-post SSA of the IM. This process constitutes the final step of the transdisciplinary process towards a full SSA per IA.

1. Introduction

The SINCERE project looks at innovative ways to value and implement forest ecosystem services (FES) through the development of novel policies and new business models, connecting knowledge and expertise from practice, science and policy, across Europe and beyond. Eleven (11) Innovation Actions – IAs (case studies) provide the basis for continuous collaborative learning in nine regions in Europe and two IAs in different continents and contexts, in Peru and Russia. SINCERE is composed of six (6) Work Packages (WPs). **This Deliverable D3.4, 'Synthesis of Innovation Action implementation' (Part II), refers to Work Package 3.** The main objective of WP3 is to develop concrete IAs and IMs, to implement them, and to analyse their implementation. WP3 has run in parallel with the work in WP2, bringing the combined innovative and creative co-design effort of stakeholders, practice partners, experts and scientists forward to IAs. **This Deliverable is an updated joint synthesis document of research and practice partners featuring the main results from the IA in terms of performance, sustainability and congruence with policy frameworks in line with the DoA.** KU Leuven, as work package leader, has coordinated the writing process of the report, in collaboration with the WP3 tasks leaders, the University of Copenhagen (UCPH) and the European Forest Institute (EFI), and capitalising on key activities that took place in the framework of SINCERE since 2018 (Figure 1). In D3.3, the practice partners contributed particularly through the reporting of their IA's development in the screening tools and the Sustainability Self-Assessment (SSA) tailored framework and reports, and through follow-up interviews at several steps of the process. D3.4 is a further developed version of D3.3 including practice partners as co-authors. More specifically, the contribution of partners has now expanded through feedback and input throughout the Deliverable with a focus on chapter 2 (Profile and Table on technical characteristics per IM) and section 4.4.2 (SSA results per

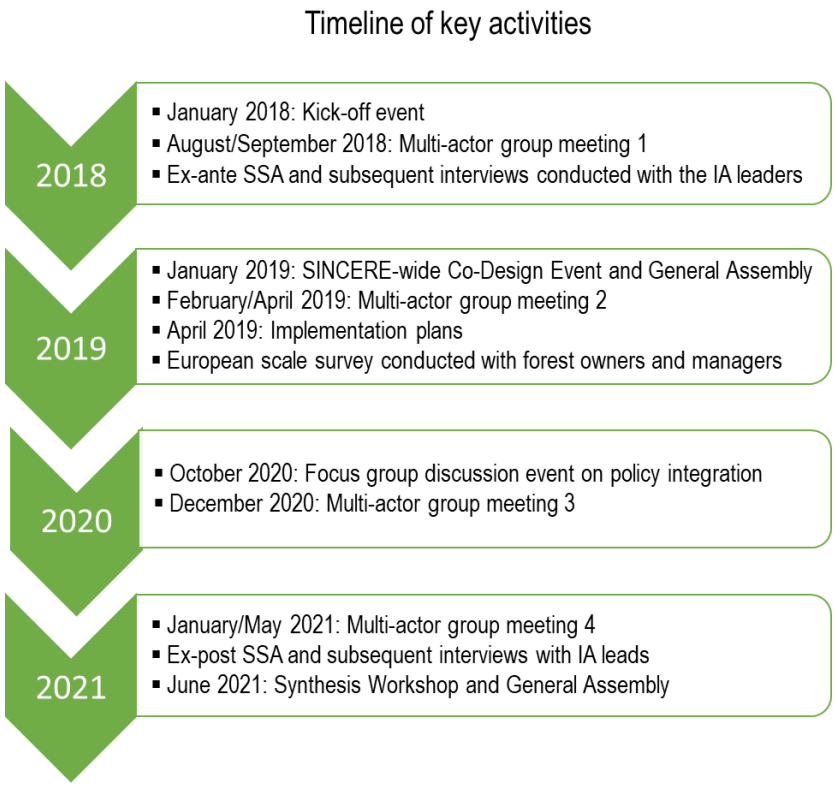

Figure 1 Timeline of key activities related to this Deliverable throughout the project's timespan

IM). It is worth noting that the partners have now contributed also with Boxes in section 4.4.2, sharing their testimonies and lessons learned. Besides the contributions from practice partners, this Deliverable also constitutes an updated version of D3.3, by presenting two in-depth SSAs (section 4.5, Belgium/Flanders and Spain/Catalonia) and, by including updates throughout the different chapters and conclusions with reflections from the Synthesis Workshop (June 2021) and on the SINCERE Impact Indicators as well.

After a brief presentation of the profiles of the IAs and their Innovative Mechanisms (IMs) in Chapter 2, Chapter 3 reports on the IAs in terms of implementation and performance up to this point. As some are still under implementation, we relate performance to both the interest by stakeholders in the process of developing the IA and their observed involvement in implementation as far as progressed. We find that the implementation status of IAs vary, as do the performance on the current data available. We expect to see performance measures pick up over time and post-project.

The overall approach for the sustainability assessment of IAs/IMs is essentially based on self-assessment by the IA practice partners with support from the research partners. **Chapter 4 goes through the steps and findings of the SSA process presenting i) the overall approach to the IMs' SSA, ii) the sustainability aspects of the screening tool and main ex-ante SSA findings, iii) the framework used for the SSA protocol, and iv) the SSA tool and the ex-post SSA findings per IM.**

In section 4.1, we describe step-by-step the whole SSA process. We start from the screening process, together with its main tool (Innovation action Screening Tool) part of which has been already reported in D3.1. The screening consisted in an ex-ante sustainability assessment: the data collected refer to all the potential IM candidates identified by the IAs in the first year of the SINCERE project (in 2018), even though some of these have been set aside in favour of the final IM selected for implementation. We then present the transdisciplinary approach followed to move towards the ex-post sustainability assessment and describe the protocol for permanent self-assessment that was formulated in co-design with all SINCERE research and practice partners and led to the development of a SSA tool based on the Principles-Criteria-Indicators (PCI) framework.

Section 4.2 is devoted to the description of the Innovation action Screening Tool and findings. In section 4.2.1, we briefly go through the sustainability elements of the screening tool and the underlying scientific literature. Section 4.2.2 presents an overview of the screening tool's sustainability findings organized around five dimensions: i) the ecological context, challenges and controversies, ii) ownership and access, iii) institutional and legal contexts, iv) the motivations behind the IMs, and v) the technical characteristics of the IMs (IMs, ecosystems targeted, relevant stakeholders). Section 4.2.3 reports common sustainability strengths and challenges among the IAs identified through the analysis of the screening tool's findings and were shared with all the research and practice partners during a collective feedback session in the Co-Design Event.

Section 4.3 presents the PCI framework used for the ex-post SSA. Although a large number of standards to assess the sustainability of forest management already exists, the specificities of the IMs developed in SINCERE required a specific sustainability assessment framework (as explained in section 4.3.1). Section 4.3.2 presents the Principles and Criteria selected by the practice and research partners together and triangulated through scientific and grey literature. Section 4.3.3 describes the process of indicators selection, which were selected by each IA partner based on their local relevance and availability and were fine-tuned through feedback and discussions with the research partners.

Section 4.4 focuses on the ex-post SSA tool and findings. Section 4.4.1 briefly introduces the SSA tool, which is composed of an excel document for the application of the sustainability indicators for each IA, and a questionnaire for comments on the indicators and for reporting the SSA results for all sustainability dimensions. Section 4.4.2 presents the SSA results per IM selected for implementation in the IAs following a common format to systematize the information while permitting a context-sensitive analysis and extraction of lessons learned. Section 4.4.2 also includes Boxes with terstimonies from practice partners to more vividly illustrate aspects reported during the SSA process.

In section 4.5, we provide an in-depth look at the SSA reports (ex-ante and ex-post results) of two IAs, Belgium/Flanders and Spain/Catalonia. The in-depth analysis is structured as follows: i) presentation of the IA, ii) Design and implementation process, iii) sustainability analysis – strong suits, successes, challenges. The in-depth look at these two IAs – that have been selected as 'case-studies' among the IAs – offers a more fine-grained image of the way the IAs progressed in parallel to the evolution of the SINCERE project. The selected IAs are complex and representative of two main types of IAs in SINCERE: first, the implementation of existing PES-like mechanisms and their adaptation to local specificities (2 pilots of inverse biodiversity auctions in IA Belgium/Flanders); second, a widely participative process creating a new ecosystem service mechanism for a certain region or country (forest management for water payment scheme in IA Spain/Catalonia).

Chapter 5 reports on congruence with policy frameworks and assess the policy support needs of the IAs. Administrative and policy support, including a payment for ecosystem services (PES) scheme, better-aligned policies and improved information systems and platforms include some of the required support. It is evident that no 'one-fits-all' solution exists. Context, FES and regional specific aspects need to be considered to provide better policy support.

In Chapter 6, we conclude by drawing conclusions on the implementation and performance of IAs, the SSA process and findings, and congruence with policy frameworks. These conclusions build on the conclusions of D3.3, which have been enhanced particularly with inshights from the Synthesis Workshop, reflections on post-SINCERE perspectives, as well as a synthesis on the different tasks' conclusions. The conclusions will be further developed and used in WP4 to formulate recommendations for future IAs.

2. Profiles of the evaluated IAs/IMs

The SINCERE case studies, referred from now on as IAs, explore new means to enhance FES in ways that benefit forest owners and managers, as well as serving the broad needs of society. Working with key stakeholders (local and supra-local), the IAs employ different IMs that offer incentives to provide relevant FES. SINCERE includes eleven (11) IAs in nine (9) countries. Here, we briefly present the profiles of the IAs and their IMs, which are thoroughly assessed on their performance, ecological, social, economic and institutional sustainability, and congruence with policy in the chapters that follow. In the end of this chapter, the profiles have been organized per IA into a synthesis table presenting the IAs' technical characteristics, namely IMs, ecosystems targeted and stakeholders included and addressed, according to input received by the practice partners.

Belgium/Flanders – Reverse auction pilots for forest ecosystem services in rural and peri-urban areas

This IA tests the reverse auction as an alternative to subsidy schemes that could provide a funding mechanism to stimulate the generation of much needed FES (i.e., wildlife population control, habitat restoration in forested hunted areas) in a densely populated and urbanised region, Flanders. This alternative approach should lead to more efficient use of the limited financial resources and support initiatives that are considered important to the relevant stakeholders and society as a whole. Two IMs have been identified for the reverse auction process: restoration of habitats in hunting areas and the creation of wild boar buffers at forest borders in rural areas.

Spain/Basque Country – Creating a new legal framework for forests addressing the ecosystem services for Bizkaia County

The main long-term objective of this IA is to create a new legal framework for forest and forestry that incorporates the concept of ES into the regional forest legislation, to improve the provision, valuation and monitoring of ES and provide the resources to pay for ES provision. The IA focuses on two FES: water quality and quantity and landscape as social and recreational use of the forest and includes research to establish the correlation between management actions and the improvement of these ecosystem services. The IM consists in creating and implementing subsidies allowing for the payment for these ES provision in the annual subsidy call of the Bizkaia Province.

Spain/Catalonia – Forests for water

This IA has two main objectives: i) including forests and forestry in a joint strategic planning instrument, and ii) the participatory design of a local Forest Fund. To address those objectives, the IA explores the implementation of an IM, a PES scheme focused on forests and water. This IM works on strengthening governance for joint forest-water strategic planning and on finding new resources to support forest owners to provide water-related services.

Finland – Landscape and Recreation Value Trade

This IA proposes a PES system, the Landscape and Recreation Value Trade, in which forest owners are compensated for voluntarily enhancing the provision of landscape and recreational values in their forests. A model for piloting this IM is developed in the Ruka-Kuusamo tourism area in Finland. It consists of a planning process to select valuable forest areas in terms of biodiversity, landscape and carbon stock and a pilot project to collect and distribute funds to implement forest management changes to support the provision of

ES in these valuable areas. The funds for the IM are collected from tourists, tourism enterpreneurs and local citizens using the area through a media campaign.

Croatia – Understanding the health functions of peri-urban forests in protected areas

This IA provides an innovative way of evaluating health as a benefit from FES. The goal is to develop several scenarios for payments of those services, while empowering future management of the protected area. Two selected IMs, one-time concession permits and donation boxes, are being implemented in the Medvednica Nature Park. These IMs raise money for new content and infrastructure to support human health and wellbeing.

Denmark – Reverse auctions pilot for biodiversity protection

This IA aims to inspire changes to existing public grant schemes for biodiversity protection on privately owned land by demonstrating in practice how a competitive bidding process can improve the coordination of nature conservation efforts, cost-effectiveness, and ownership among landowners. The IM itself is a reverse auction where forest owners offer biodiversity conservation measures, they decide themselves as a response to a fairly open call. In the offer, they describe the measure in terms of actions, imposed restrictions and the price they ask for.

Italy/Borgo – The Mushrooms of Borgotaro IGP

The 'Mushrooms of Borgotaro IGP' are produced in the woods of the Tuscan-Emilian Apennines. The IA was implemented firstly in 1964 with the creation of the Consorzio Comunalie Parmensi (CCP) to organize the commercialisation of recreational permits for wild mushroom collection. In the framework of SINCERE the IA is renewed through the development of an IM which consists of a new online platform or application to improve the commercialisation of the permits and the pickers' experience. The main goal of this IM is to change the typology of users and demands (to reach younger customers, to orient pickers to areas specific to their permit category, and to improve the security of visitors).

Italy/Etifor – Forest-habitat biodiversity payment scheme

This IA sets up a partnership between the regional park and local poplar plantations with the double objective of increasing the sustainable management of the plantations while increasing funding for restoration of crucial areas within the regional park. The IM includes a Payment for Biodiversity Conservation Scheme that brings together park authorities, and poplar farmers under the common framework of FSC® (Forest Stewardship Council) certification; it also includes the timber processing industries to secure a continuous demand of FSC certified wood and to explore the possibility to establish a premium price for it. The IM reduces management and certification costs and facilitates certification for traditional poplar farmers, organising them into a certification group, while benefitting the natural environment of the Regional Park.

Peru – Paying for watershed services to cities

This IA focuses on how a fee on the water bill in the city of Cusco can be used to improve hydrological services around the Piuray watershed in collaboration with local communities. The objectives are to i) implement ecosystem-based interventions in watersheds for improving water security, and ii) involve multiple stakeholders in decision-making and share intervention costs and benefits in a fair manner, as an opportunity to improve relationships between upstream communities and a downstream urban water company. The IA includes the pilot implementation of a PES that rewards the work of local communities on interventions aimed to improve hydrological services. The IM is aimed to serve as a learning site for other PES schemes in the country.

Russia – Providing multiple ecosystems services by forest renters

This IA aims to develop mechanisms for multi-purpose forest management, introducing the concept of ES and multi-purpose forest use into the current forest renting system which currently only provide leases for single ES. The overall objective is changing management priorities from wood harvesting to forest growing. The IA includes the monitoring of ES in a pilot project Club GREY HORSE in order to draw legislative recommendations for the development of the IM. The IM refers to the introduction of a multi-purpose lease of a forest plot by one tenant in the Forest Law to increase the economic efficiency of forest use while maintaining a balance between all ES.

Switzerland – Spiritual forests and forest kindergartens

Traditionally, there are several places in the Swiss forest where people seek spiritual strength from nature, so-called 'places of power'. In the last decade, a new form of ES-based business can be seen in some regions in Switzerland– Funeral Forests, but it is mostly done by non-forest-actors who pay a small rent to the forest owner. This IA explores how managing forests to be used as spiritual forests could benefit both the forest and the forest owner. The IM aims at raising awareness of the importance of Cultural Ecosystem Services (CES) and motivating forest actors to supply this service and to manage forests appropriately. The IM is market-based, and its idea, concept and implementation come from the forest owner.

Technical characteristics: IMs, ecosystems targeted and relevant stakeholders

Table 1 IAs' Technical Characteristics

Cases	Innovative Mechanisms	Ecosystems targeted	Providers (sellers)	Users (buyers)	Stakeholders involved in MAG process
Belgium/Flanders (1/2)	First rejected price reverse auction	Wildlife Population control (buffer strips between forests and agricultural lands)	Farmers (for buffer strips) in agreement with the hunter's operating on their fields	▪ Hunters (Hubertus Vereniging Vlaanderen) ▪ Public administration Flemish Agency for Nature and Forest (ANB)	▪ Public administration Flemish Agency for Nature and Forest (ANB) ▪ Farmers (Boerenbond) ▪ Hunters (Hubertus Vereniging Vlaanderen) ▪ Private forest owners (Aanspreekpunt Privaat Beheer – Natuur en Bos) ▪ Research partners
Belgium/Flanders (2/2)	Discriminatory price auction	Habitat restoration in forested hunting areas	Forest owners (habitat restoration)	▪ Hunters (Hubertus Vereniging Vlaanderen) ▪ Public administration Flemish Agency for Nature and Forest (ANB)	▪ Public administration Flemish Agency for Nature and Forest (ANB) ▪ Farmers (Boerenbond) ▪ Hunters (Hubertus Vereniging Vlaanderen) ▪ Private forest owners (Aanspreekpunt Privaat Beheer – Natuur en Bos) ▪ Research partners
Spain/Catalonia	Integration of forestry in the Urbanistic Masterplan (PDU) of the Rialb water reservoir Creation of a private forest fund	Water provision (quantity and quality) Other ecosystems "in the area" are also expected to be positively impacted	Forest owners	Different typologies of water consumers (farmers, municipalities, individuals), industries and businesses	▪ Public administrations and politicians at the municipal level ▪ Forest owners ▪ Research partners
Spain/Basque Country	Legal framework for embedding forest management for water, landscape and timber services	All ES with focus on: Water quality, Water quantity, Landscape and Timber	Depends on the service provided. Public Administration or private owners, initiatives…	The whole society, the foresters, the owners, the farmers, etc.	▪ Foresters, ▪ Farmers, ▪ Land Owners, ▪ Associations, ▪ Public administration,

					▪ University/research partners
Croatia	Donation boxes One-time concession permits	Socio ecological FES (health, vacation, recreation, tourism, biodiversity, climate)	Not specified ('whole population') Public administration of the park (P.I.N.P. MEDVEDNICA) and private owners	Organizations, companies, associations and all who organize events in the area of Medvednica Nature Park, and visitors for donation boxes	▪ Public administration of the park (P.I.N.P. MEDVEDNICA), ▪ Research partners (Institute for Development and International Relations - IRMO), ▪ Civil society, ▪ Associations (Croatian Mountain rescue service), ▪ business (hotels, resorts, web service providers)
Denmark	Reverse Auction	Biodiversity protection	Forest owners	Society in general through the Public administration.	▪ Forest owners ▪ Environmental nongovernmental organisations (ENGOs) ▪ Foresters
Finland	Landscape and Recreation Value Trade	Maintaining and improving landscape and biodiversity areis the targeted ecosystem services. Additional advantages can be received simultaneously from biodiversity, water protection, forests as from carbon sequestration and carbon storage and water protection.local culture.	Private forest owners	▪ Tourism entrepreneurs ▪ Visitors ▪ Local inhabitants ▪ (Potential: municipality)	▪ Forest owners ▪ Tourism enterprises ▪ Municipality and local government ▪ Forest industry ▪ Environmental NGOs ▪ Local population ▪ State government and ministries
Italy/Etifor	Forest-habitat biodiversity payment scheme (certification poplar plantations)	The ecosystems involved are fluvial forests, such as willows, rushes or mixed lowland forest, and other natural riparian habitats, such as wetlands.	The Regional Park	Owners of the poplar plantations	▪ Forest Stewardship Council (FSC) members ▪ Poplar growers and associations ▪ Poplar industries ▪ Park and regional authorities ▪ Freelance forestry professionals

Italy/Borgo	Consorzio Comunalie Parmensi (CCP) will implement an app-based tool to improve the commercialization of recreational wild mushroom picking permits	Recreational use of mushrooms	CCP (forest owners and manager)	Recreational wild mushroom pickers	▪ CCP members ▪ Recreational and professional wild mushroom pickers association ▪ Buyers and processors of wild mushrooms ▪ Organization dealing with tourism ▪ Municipal authorities
Peru	Paying for watershed services to cities	The ecosystem services targeted by the IM are water and soil regulation services. However, other services that are in tradeoffs with regulation services, such as agricultural production are also considered	Local communities of the Piuray Watershed (with supervision of the urban water utility company SEDACUSCO)	SEDACUSCO and urban water users in Cusco. Local communities may also benefit, depending on the modalities of the IM.	▪ Urban water utility SEDACUSCO ▪ The micro-watershed management committee ▪ The municipality ▪ Local communities of the Piuray Watershed
Russia	Providing multiple ecosystems services by forest renters. There is no single mechanism described.	Not clear. Four were mentioned: regulating ecosystem services, cultural, provisioning, biodiversity.	Not possible to define at this stage	Forest tenants	▪ Forest tenants ▪ Local authorities/ municipalities ▪ Nature conservation organizations ▪ Local residents
Switzerland	Spiritual Forests and Forest Kindergartens	Different cultural ecosystem services within the categories “physical experience”, “cognitive experience” and “emotional-spiritual experience”	Forest enterprises	▪ Forest owners ▪ Municipality ▪ Clients and forest users	▪ Forest owners ▪ Companies ▪ Users ▪ Local authorities ▪ Citizens

3. Implementation and performance of IAs

This chapter evaluates the state of implementation and performance for each IA. Implementation will be assessed based on the data we have for IAs' state before 2021. The terminology of implementation phases used in the SINCERE application spans from initial to early and, finally, mature phases. Given the heterogeneity of IAs in terms of e.g., depth of innovation, initial developments, framework conditions, and gain versus risk, we consider this terminology too coarse to reflect the real advances in implementation. Therefore, we have inserted an additional phase termed 'developed' indicating a phase where the IM has been fully developed but not launched yet or very recently launched and e.g., no transactions has taken place yet. The innovation progress continuum is in this Deliverable thus updated as illustrated in figure 2.

Figure 2 Innovation progress phases

Ideally, performance should be assessed and evaluated based on the IA's effect on the ES it is expected to change or conserve. For instance, this could refer to the effect on landscape, biodiversity or water provision. However, the effect on these ES will hardly be measurable within the relatively short lifespan of SINCERE and therefore it makes little sense to evaluate performance in terms of the desired final effect on ES. Instead, we aim at assessing whether the IA has succeeded in providing conditions that have secured threatened ES and/or ensure ES provision in the future. When possible, we will also provide a quantification of these conditions. Furthermore, performance is measured based on alternative indicators such as proxies for demand, interest in the IA and, where relevant and possible, participation in e.g., Regional Multi-Actor Group meetings (MAG). The IMs are purposely diverse and therefore the performance indicators cannot directly be compared over the IMs.

The insights from this chapter build mainly on information provided in the SSA reports and the follow-up interviews conducted with the partners (see section 4.4). The indicators presented for performance assessment will later feed into SINCERE's upscaling considerations in terms of replicability of the IMs in Europe and beyond.

Belgium/Flanders – Reverse auction pilots for forest ecosystem services in rural and peri-urban areas

Implementation: The Belgium/Flanders IA consists of two reverse auctions IMs; one concerning buffers for wild boar management and one for habitat restoration. Both auctions have been launched, bids have been received and selected through several rounds and the main part of the IM has thus been implemented. The auction related to wild boar was terminated because of legal issues, but for the habitat restoration auction, only the actual implementation and monitoring of the actions related to the contracted bids, and the evaluation of financial and administrative efficiency remains. This IM is therefore in the mature phase of implementation.

Performance: The auction regarding habitat restoration obtained 25 bids covering a total budget of 150,000 EUR. In total, 15 projects have been approved, covering an area of about 141 hectares, where conditions

for protecting biodiversity, restoring landscape features and water bodies have been obtained. Although only a relatively small number of stakeholders did participate in the MAG meetings, the most important and active partners were represented. The number of bidders participating in the auction can be seen as an indicator of performance. In the case of the wild boar action, only a relatively small number of bids eight (8) was obtained and the auction was terminated without contracting. Nevertheless, due to the results of the IM on habitat restoration, this IA performed well on securing conditions for FES and as a competitive instrument.

Spain/Basque Country – Creating a new legal framework for forests addressing the ecosystem services for Bizkaia County

Implementation: This IA covers provincial legislation on PES related to water quality, quantity and landscape in terms of compensating forest owners for carrying out management actions that will contribute to the provision of these ES. The IM consists of integrating subsidies for the payment of water related ES in the annual call of the Bizkaia province, based on the measures included in the framework of the EU rural development plan. The call has been drafted and is currently reviewed by the legal department of the Bizkaia regional council. In parallel, an extensive survey is carried out with forest owners to assess landscape services and management measures that could improve them, in order to inform a future subsidy for landscape related ES provision. The legal framework for utilizing PES and the necessary funding is not established yet and the IM is therefore in the developed phase of implementation.

Performance: More than 150 stakeholders have been participating in the MAG meetings indicating a great interest in the IM. The potential for securing PES is promising, but due to the still developing implementation, it is not possible to evaluate performance beyond this.

Spain/Catalonia – Forests and Water

Implementation: This IA is a PES scheme involving a voluntary payment from companies and public institutions to a fund that pays forest owners for management that will increase FES especially in terms of water but also carbon and biodiversity. The IM includes the creation of a forest owner association and the establishment of the Forest for Water Fund, to the benefit of the forest owner association. At this point in time there is no any economic impact yet. The first transactions to the fund are not foreseen before the end of 2021 and thus no management changes have been observed that will affect the FES. The IA is therefore still in the developed phase of implementation. Once implemented, both an income effect for forest owners and an increase in FES for the public is expected.

Performance: The IM involved a total of four MAG meetings connecting people in charge of regional water planning, regional forest planning, local politicians, local and regional forest owners, local forest users' companies, and managed to reach a consensus on the positive role of forestry regarding water provision. Furthermore, the IM has initiated fruitful discussions between the Catalan water management responsible body and the Forest planning responsible body in Catalonia. The cost-efficiency of the IM cannot be documented at this stage before transactions and related forest management will happen and performance will depend on the success of attracting donations to the fund.

Finland – Landscape and Recreation Value Trade

Implementation: This IA concerns securing PES in terms of landscape and biodiversity values through private donations. The IM has been fully implemented, i.e., awareness campaign has been launched, payment vehicle has been established and funds have been collected. Only reporting of results and conclusion remain. Thus, the IM is therefore in the mature phase of implementation.

Performance: In terms of private donations, the IA reached a total of 1,000 EUR and has secured the conditions for FES on 3 hectares of land. In that light, the IA has succeeded in terms of demonstrating the mechanism as a pilot project. MAG meetings are described as being important for the process of awareness and instrumental for raising eagerness amongst the stakeholders. The marketing and awareness campaign has reached an estimated 1.5 million contacts.

Croatia – Understanding the health functions of peri-urban forests in protected areas

Implementation: The Croatia IA consists of two IMs; donation boxes for funding PES and one-time concession permits for organized activities to ensure awareness of protected areas in the Medvednica and secure funding for management and infrastructure. The implementation of donation boxes was terminated due to the theft and vandalism and lack of willingness to pay. The establishment of concessions has been implemented and is currently up and running while being monitored. The IM is thus in the mature phase of implementation.

Performance: The MAG meetings covered a broad range of stakeholders, except private forest owners and the IM is broadly accepted by all stakeholders. Indicators for performance could be related to the number of permits sold and the related funds being obtained. The exact number is not mentioned, but pre-Covid-19 approximately one permit per week was issued. The funds raised are not mentioned but should be fully correlated with the number of permits issued. The fee is described as small, but the IA believes that in the future it will be an important contribution to the reconstruction and maintanence of infrastructure as the number of concession approvals will increase when going back to the “old-normal” i.e., to the pre-pandemic state.

Denmark – Reverse auctions pilot for biodiversity protection

Implementation: This IA includes a reverse auction IM concerning biodiversity protection in Danish forests areas. The auction has been held, bids are received and selected and the main part of the IM has thus been implemented. Contracts for biodiversity actions with landowners have been produced and are only awaiting legal registration and transfer of funds to land owners. The IM is therefore in the mature phase of implementation.

Performance: A total of 24 bids covering a total of about 190,000 Euro was obtained through the bidding process, thus exhausting the budget with a factor of three. Contracts were offered to eight (8) landowners spending the total budget available for conservation of about 55,000 EUR. This has enabled biodiversity protection for about 17 hectares of land including 108 trees that will be left for natural decay. About 50 stakeholders have participated in the first three MAG meetings. The fourth MAG was held in April 2021. The auction was announced broadly on social media and relevant magazines but the audience size reached is not known.

Italy/Borgo – The Mushrooms of Borgotaro IGP

Implementation: The IA covers an online/web version of an existing paper-based system of selling permits for mushroom picking in Italian forests. The software has been produced and the beta version has been launched in March 2021. The IM is therefore in the developed phase of the implementation.

Performance: The number of stakeholders participating in the MAG meetings is not reported. As the technical part of the IM, the web application, has just been launched in spring 2021, there are no good indicators so far to evaluate performance. In the mid-term, the number of downloads in the months following the launch of the web portal would be a first indicator of performance. On a longer time-scale, the increase in number mushroom picking permits that have been sold, e.g., as new (types of) customers are attracted, and the increase in funds generated (compared to previous years) would serve as a reliable indicator for the immediate performance. The funds generated would potentially provide conditions for FES provision in the future.

Italy/Etifor – Forest-habitat biodiversity payment scheme

Implementation: The IA includes a biodiversity conservation scheme where poplar farms pay regional parks for conserving/restoring land to achieve an FSC certification, which in turn should allow for a premium on sold wood products. The IM has a solid construction and well-defined incentive structures. The first agreements between farms and parks have been signed and the IA is thus in the mature phase of implementation and is now being replicated.

Performance: Four contracts between the park and poplar farms have been signed so far, generating funds for conservation at a total of 98,705 EUR. These contracts have enabled the creation of 4.4 hectares of natural forest and secured better conditions for about 108 hectares of natural forests. The price premium obtained for wood products sold as FSC certified could be another indicator of performance. At this point, the awareness and/or value of the FSC certification amongst customers seem to be low and therefore difficult to obtain the expected price premium. However, what is obtained is market access to all markets requiring certification.

Peru – Paying for watershed services to cities

Implementation: This IA includes a PES scheme where water users pay an extra fee on the water bill, which is used to improve hydrological services through the planting of trees and the creation of infiltration trenches. The IM has a solid construction and well-defined incentive structures. The fee was implanted in 2019 and (some) actions have been undertaken. As such, the IM is in the mature phase of implementation.

Performance: The IA has provided the conditions for securing drinking water in the future for the local area in Peru. Furthermore, several numbers could serve as indicators of the performance of the IA. The funds generated through the additional fee, the number of trenches created and trees planted and the salary paid to local communities. None of these numbers are available at the moment.

Russia – Providing multiple ecosystems services by forest renters

Implementation: This IA seeks to improve regulation in order to allow for multiple uses of FES through one single lease. A draft of the new legislation has been completed and circulated and has been considered at various governmental agencies. Considering that adoption and implementation of new legislation is quite an extended process, the IM is still in the developed phase of implementation.

Performance: Based on the state of implementation, the performance cannot be assessed at this point. However, it is worth mentioning that if the draft legislation is accepted, it has the potential for improving conditions for FES over very large areas of forest land.

Switzerland – Spiritual forests and forest kindergartens

Implementation: This IA enables contracts that allow families to bury the ashes of deceased family members in the forest at designated trees. The family pays for conserving individual trees for 30 years. The IA's legal framework has been arranged to comply with the legal context and the corresponding permits have been obtained. The first contracts were signed in 2018, and the IA has steadily added contracts at the targeted pace Thus, the IM is in the mature phase of implementation.

Performance: Indicators of performance could be the number of contracts signed between forest owners and families, the number of trees conserved or landowner income generated through contracts. None of these numbers is available at the moment.

4. Sustainability self-assessment: methods, tools and findings

This chapter refers to WP3 - Task 3.2 'Analysing and supporting innovation actions' and presents the overall approach to the Sustainability Self-Assessment (SSA), the procedures, methods and tools followed throughout, and the main findings on the sustainability of IAs/IMs. In the following sections, we go through the steps and findings of the SSA process, presenting i) the overall approach to the IMs' sustainability assessment (section 4.1), ii) the screening tool and main ex-ante SSA findings (section 4.2), iii) the framework for the SSA protocol (Principles-Criteria-Indicators – section 4.3), iv) the SSA tool and the (ex-post) SSA findings per IM (section 4.4), and v) a detailed version of the SSA findings for the cases of IA Belgium/Flanders and IA Spain/Catalonia (section 4.5).

4.1 The overall approach to the Sustainability Self-Assessment

As described in WP3, Task 3.2 aims at analysing and supporting the IAs step by step in carrying a full sustainability assessment of their existing or in-the-making IMs. This is achieved through ex-ante sustainability assessment using a screening approach during the design stage and in relation to Task 2.2, and through ex-post sustainability assessment using an optimisation approach during the implementation stage in Task 3.1. **The overall approach is essentially based on self-assessment by the IA practice partners with support from the research partners. The self-assessment concerns a comprehensive sustainability assessment of the IMs addressing environmental, social, economic and institutional dimensions.**

For the ex-ante sustainability assessment during the design stage, **the 'Innovation Action Screening Tool' was designed (Milestone 3.1) and mobilized (section 4.2 and D3.1 and D3.2).** This tool consists of a questionnaire, developed to collect data for the economic pre-feasibility assessment of IAs and the sustainability self-assessment. The tool served as the starting point for a targeted feedback process with both direct written and oral feedback to IAs partners as well as a joint learning process which culminated at the Co-Design Event of SINCERE (23d January 2019). In this sense, this Innovation Action Screening tool aimed at contributing to the identification and design of each IA and critically assessing the IMs that were considered as part of the innovation actions, encouraging the practice partners to consider important sustainability and economic design issues. The screening tool was devised by calling on the expertise of each partner leading tasks 3.1, 3.2, and 3.3 in order to cover the core focus of each task, namely: economic feasibility, sustainability issues and policy context, as well as the coordinator of WP2 to ensure coherence with the instructions for stakeholders mapping and engagement. The writing process was done through brainstorming meetings within each task teams and several rounds of reviews both within and between the task teams in the first months of 2018. The process of data collection, analyses and feedback was carefully intertwined with the MAG-process coordinated from WP2 and thus constant and repeated coordination efforts between partners of WP2 and WP3 has been instrumental in preparations. A first version of the tool was tested by the partners from the IA in Belgium/Flanders to ensure its relevance, both in format and content, and to improve it accordingly.

Between June and October 2018, practice partners answered the three parts of the screening questionnaire with information and remarks informing researchers of IAs/IMs and regional specific issues, opportunities and challenges. Those issues were explored further and analysed through clarification questions and skype meetings with practice partners and through meetings gathering WP2 and WP3

researchers between November 2018 and January 2019. The results of these analyses were shared individually with each IA partners and collectively during the Co-Design Event at the end of January 2019, which facilitated some more in-depth discussion on each IA's challenges and potential ways forward.

Moving into the implementation phase and for the ex-post sustainability assessment (Figure 3), a protocol for permanent self-assessment was developed in co-design with all SINCERE partners. More particularly, a **'sustainability self-assessment tool' was developed in co-design with SINCERE research and practice partners through a process freely inspired and adapted from the Delphi method.** Several iterations between researchers and practice partners (and local stakeholders) led from the screening to the first version of the SSA tool, through the collective identification of main sustainability issues at the SINCERE General Assembly in January 2019. Each iteration consisted of input from researchers about the most relevant issues to be monitored from a research perspective and input from practice partners about the most relevant issues pertaining to each regional IA and experience.

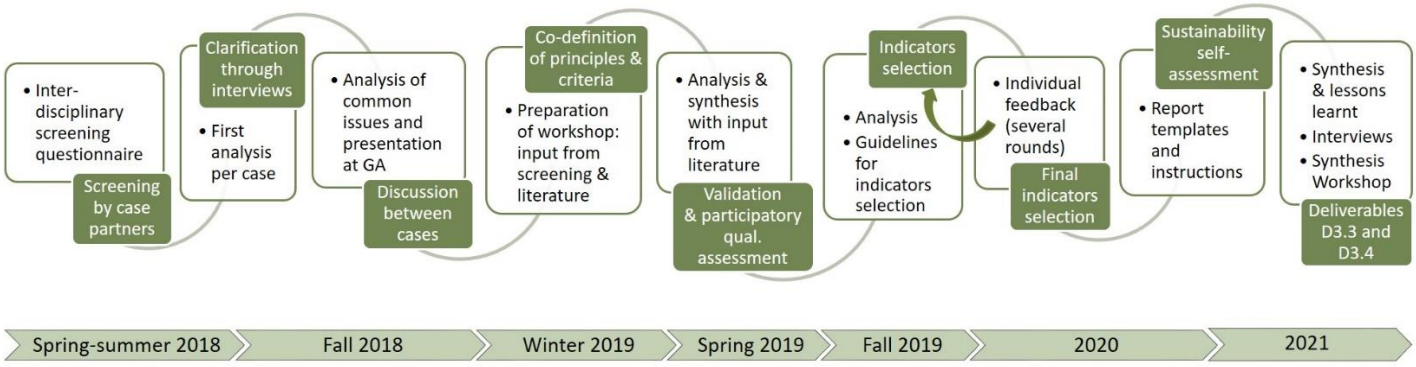

Figure 3 Iterations in the process from screening to self-sustainability assessment

More specifically, in parallel to the data collection, analyses and feedback through the Innovation Action Screening tool as described above, the WP3 researchers explored which kind of ex-post sustainability assessment approach would be most suited to be adopted, and decided to work with a **Principles-Criteria-Indicator framework (PCI), which is the most common framework in the context of sustainable forest management (section 4.3 in this document and M3.3)**. At the SINCERE General Assembly, a participatory exercise was organized and gathered all SINCERE partners around the question of which are the main sustainability goals that IA's should pursue in the design and implementation of IMs (Figure 4). After a first brainstorm of all ecological, economic, social, institutional and mechanism or ecosystem services-related sustainability issues that IM developed in the context of SINCERE could encounter, the SINCERE partners worked in five small groups on the definition of principles and criteria that the IMs should comply with. After the General Assembly, WP3 Task 3.2 researchers synthesized the results of the exercise, compared and completed it with insight from scientific and grey literature in order to come to a full list of Principles and Criteria. This list was then sent for potential modification and final consent from all SINCERE partners to assess sustainability against this standard. The indicators were selected by each IA partner, based on their local relevance and availability and were fine-tuned through individual feedback and discussions with the research team (see section 4.3.3).

On this basis, the IA partners self-assessed the sustainability of their IM in 2020, with support from research partners, local stakeholders and WP3 task 3.2 researchers, to improve the IM design and implementation processes accordingly (section 4.4). This process of self-assessment and consequential adaptations are being documented and analysed in order to continuously improve and eventually validate the self-assessment approach itself. The final objective is to lead to the co-development of a 'sustainability self-assessment tool' suitable for the design and implementation of any similar IM for forest ecosystem services.

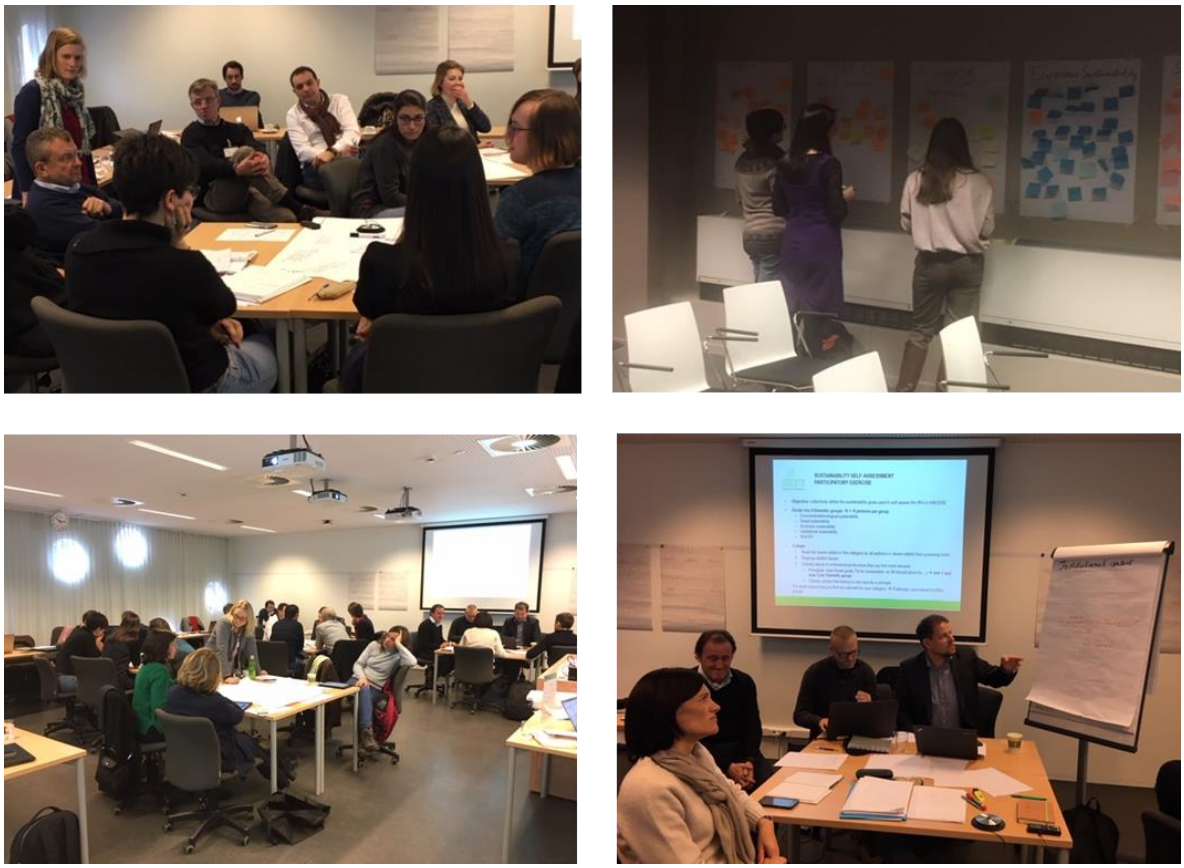

Figure 4 SINCERE research and practice partners working together and co-designing the self-assessment protocol during the G.A.

The whole SSA process was purposefully designed adopting a transdisciplinary approach. There is an increasing acknowledgement that sustainability issues are complex and "characterized by uncertainty, instability, uniqueness and value-conflict" (Popa et al., 2014), and as such, they require new ways of knowledge production and decision-making (Lang et al., 2012). In this respect, transdisciplinarity is crucial for sustainability. Transdisciplinarity implies collaboration between research and non-research actors, and across disciplines, at least in three collaborative phases (Lang et al., 2012):

- Frame the problem together and build a collaborative framework (Phase A)
- Co-produce solution oriented and transferable knowledge through collaborative research (Phase B)
- (Re-)integrate and apply the produced knowledge in both scientific and societal practice (Phase C).

For this reason, it was essential to collectively reflect on the meaning of applied sustainability in the SINCERE project, with practitioners and researchers bringing in different experiences, skills, knowledge and positions to the discussion. The SSA is meant to trigger a reflexive process facilitating the analysis of both researchers and practitioners regarding their respective practices towards sustainability, with the aim of co-producing knowledge that is directly relevant and applicable for action. This reflexive process must be based on a mutual understanding of the issues at stake. Collaborative definition of the sustainability goals enables a common framing of the problem, provides a common language and permits to collectively engage in critical reflection upon the identified issues. On this basis, **the SSA protocol offers a process of experiential learning for both practitioners and researchers.**

4.2 Screening process: the IA screening tool and main sustainability findings

4.2.1 The sustainability elements of the IA screening tool

The screening tool is organized into three sections (see D3.1 for its full presentation): i) Profile of the IA case, ii) Part I – information regarding the context of the IA case, and iii) Part II – information referring specifically to the IM, its feasibility and possible impacts. Along with the Profile section, Part I was filled in by each IA's practice partners before the first MAG meeting. Part II was filled in after the first MAG meeting, as it was during that meeting that the candidate IM composing an innovation action in the region was co-selected. The economic research underlying Part III along with the related findings have been discussed in Deliverable 3.1. In this Deliverable, the focus is on the Profile of the IA, Part I, and Part II (Questions 1-8), which include those aspects that are most relevant for the sustainability assessment of the IAs.

To develop the sustainability part of the tool, we started by identifying the dimensions most relevant to investigate in each IA based on the three pillars concept of sustainability and the specifics of the type of IA developed in SINCERE (i.e., mechanisms for governance and supply of forest ecosystem services). These steps provided the questions forming Part I of the Screening Checklist, which outlines the ecological and socio-cultural context of each IA. In the same perspective, questions were added to investigate the degree of awareness, anticipation and strategy of the IA partners in the identification and mitigation of sustainability issues (in Part II). From a social science perspective, it was also crucial to know more about the origins of the IA and investigate the IA leaders' perceptions of their context, the reasons why this specific IA was needed in their local area, as well as the motivation behind their choice of each IM. These questions formed the Profile part and the introduction to the Part II of the Screening Checklist (Questions 1-8). Overall, for the development of the sustainability part of the screening tool the research team consulted and built on the experience of a number of other sustainability frameworks and tools including the KLIMOS Environmental Sustainability Toolkit, the ENCOFOR Environmental Impact Assessment tool (Muys et al., 2007; Robledo, 2007), and additional scientific literature (Holvoet and Muys, 2004; Maes et al., 2010; Madlener et al., 2006; Robledo-Abad et al., 2016). In sections 4.2.2 and 4.2.3, we present an overview of the related findings along with the identification of common strengths and challenges among the IAs.

4.2.2 An overview of the ex-ante sustainability assessment findings

The overview has been organized around four (4) dimensions: i) the ecological context, challenges and controversies, ii) ownership and access, iii) institutional and legal contexts, and iv) the motivations behind the IMs. For the details of the case studies in terms of Profile of the IA, Part I, and Part II (Questions 1-8),

we refer to their responses to the Innovation Action Screening tool included in Appendix 1 of D3.3. The responses to the remaining questions are included in D3.1.

Ecological context, challenges and controversies

Each of the IM is situated in **different ecological contexts and face diverse ecological challenges.** The main ecological challenges for the forest areas included in the IMs are biodiversity loss and habitat degradation, diminishing share in old forests, diseases affecting trees (e.g., fungus Radiata), soil erosion, clearcutting, risk of decreasing water levels, and water pollution. **All of the IAs reported also diverse environmental controversies referring to their broader contexts, some of which directly connect to the IAs' aims and challenges.** The IA Belgium/Flanders partners mention a range of ecological challenges and highlight the main ecological controversies in the area, which connect to their IA: i) deforestation for economic purposes, ii) explosive wild boar population growth leading to damage to agriculture and gardens and challenging traffic safety, and iii) nitrogen deposition, which is the main environmental threat to Natura 2000 while its alleviation is impacting hundreds of farms. IA Croatia reports issues connected to climate and regional change (floods, erosions, destroying winds, droughts, succession of lawns / meadows in the absence of livestock breeding) but also ecological problems due to human activities that do not comply with the forestry ethics and pay little attention to nature protection. IA Denmark puts focus on current discussions and debates related to the environmental regulation of the agriculture sector, cost-effective climate change adaptation measures, biodiversity protection, the contentious issue of recreational access to forests, and the controversies around the re-immigration and re-introduction of wildlife. The partners from IA Finland highlight the diminishing share of old forests, the challenge of maintaining and enhancing biodiversity, the challenge of sustainable tourism and mineral extraction. IA Italy/Borgo reports that the main environmental controversy in the area is related to the fauna disturbance highlighted by the radical conservationists, while IA Italy/Etifor focuses on the loss of biodiversity, especially related to aquatic habitats, the spread of alien species and the disappearance of characteristics wetlands due to drought. For the IA Peru, the main environmental issues concern: i) water pollution (from domestic sewage and agriculture, see picture), ii) risk of decreasing water lake levels due to drought or water overharvesting, and iii) risk of rapid urbanization leading to pollution and land surface impermeabilization. The major problems for the region of the IA Russia concern the decrease in biodiversity but also the collection and utilisation of domestic waste, which, in the absence of prescribed areas of waste storage, pollutes the whole region, forest lands included. In the Basque country, a fungus disease that is affecting an important area of the Radiata Pine – including the area of the Spain/Basque Country IA – has raised a social debate about which are the best species to replant the affected areas and about the forest policy overall. The IA Spain/Catalonia reports that the lack of profitability of the Catalonian forests result in an increasing forest surface in the region and a poor forest management generating environmental problems such as large forest fires, forest diseases or mortality by drought episodes. According to IA Switzerland, there has been little controversy in the Swiss forests in recent years.

Ownership and access

Concerning ownership, there is a **clear tendency among the cases towards private ownership with most of the IA partners reporting around 70% of private ownership**. Private ownership does change the way in which the IMs address socio-ecological challenges. Flanders has 70% of its forest under private landholders that usually do not possess more than one hectare. The Spain/Basque Country has around 75% of its territory covered by forests and Spain/Catalonia has the same proportion (around 70 and 75% of private forests). The Denmark case has the same characteristics concerning ownership and 72% of its

forests are privately owned as well. IA Finland declared 70% private ownership. Italy has some differences according to the region (most private forests in the north, especially in Lombardia region), but the general trend is still towards private ownership (63.5%). For the Italy/Etifor case it is stated by the IA partners that at a regional level approximately 2/3 of the natural forests are owned by privates, while 1/3 is publicly owned, mainly by the region or municipalities. In the IA Croatia, the Nature Park Medvednica forest ownership is approx. 50% public and 50% private. Some countries show a very different pattern where the state monopolizes forest ownership. This group is led by Russia, which has 97% of its territory covered by public owned forests. Russia is followed by Switzerland (75%). In Peru, the state owns all the forests and gives concessions that can also be communal.

In certain countries, private property also confers the right to restrict access to the public. Nevertheless, **in most of the study cases partners did not report in their screening list any access restriction to the public.** For the Spain/Basque Country case, the IA Partners report that there is no restriction access despite having private property. Access in Spain/Catalonia is open and free unless the forest owners explicitly prevent it (with a visible sign at the entrance). In IA Croatia, there are no access problems reported by the partners and that could be explained by the public character of most of the forests. In IA Finland, no access issues are reported. On the other hand, the IA Belgium/Flanders partners report that the Flemish forests are mostly private and the owners have the right to restrict access to the public, which is creating a problem of public health. Flemish citizens lack access to forests and the ratio of forest per inhabitant is one of the lowest in Europe. Denmark faces a similar problem with Belgium/Flanders, where IA partners declared that access to private forests remains a contentious issue. Demand for recreation use is increasing but access to private forest is debated. In Italy, there are some differences between the two cases. Forest owners in the Italy/Etifor case have the right to fence the property but the situation is diversified and "impossible to describe it in general terms, and the access is mainly depending on the main function of the area, its characteristics, its practicability". In the Italy/Borgo case, the members of the CCP own the forests (there are community forests or a private entity with a public function). The Italy/Borgo IA partners declared that there are no restrictions to access in the context of its own case. In the Peruvian case, access to the forest is guaranteed for the local communities by the rights of the concessions. For the rest of the public accessibility is not clear. In Russia, there is a similar situation. The state gives a concession (40 years contract with a tenant) and meanwhile, the usufruct of the property and the access remain under the decision of the tenant. In Switzerland, all forests are accessible to the public, despite being private.

Institutional and legal contexts

Institutional and legal contexts for each of the cases are not extensively explained or described by the partners in the screening lists. Nevertheless, most of the IA partners have mentioned which regulation or specific legislation body is going to affect or frame the implementation of their IMs. Some aspects, main differences and common aspects, are worth mentioning. First, **most cases have forestry legislation that contemplates the sustainable and multifunctional management of the forest.** The most relevant exception to this is the Russian IA, where the implementation of the IM requires a change in the legislation. Currently, tenants can only perform one activity in their concessions, which directly contradicts the idea of sustainable and multifunctional management of the forest. Second, **the process to implement the IMs in the case studies requires cross-sectoral coordination among different governmental agencies.** Where a payment (for example the reverse auction in the IAs of Belgium/Flanders and Demark) is involved, coordination between different governmental agencies is necessary to avoid overlapping and mismatches. This is especially evident in between the agricultural and the environmental sectors: most of the prior

schemes to enhance biodiversity in Europe involve agro-environmental subsidies. Other interesting examples to illustrate the cross-sectorial nature of the mechanisms can be found in Spain/Catalonia and Peru. Both IAs exemplify the importance to acknowledge the link between forests, forestry and water into legislation. In the Spain/Catalonia IA this still does not exist in the legislation and in the Peruvian case, some new legislative changes have been positive in this matter but still need to be implemented. Third, **there are some differences between the levels of understanding of the PES approach in the diverse legislations.** For some of the IAs legislation is more oriented towards the PES framework (Denmark, Belgium/Flanders, Switzerland and to some extent Finland). For the cases of Peru, Croatia, Spain/Catalonia, Italy/Etifor and Italy/Borgo, there is relative legislation but it requires more adaptation to experiences on the ground. In the cases of Russia and Spain/Basque Country, the legislation does not consider the PES framework at all.

Motivations behind the IMs

Motivations behind the implementation and design of each IM are diverse and context situated **but generally relate to ecological motivations, business-economic oriented motivations, and societal motivations**. More specifically, the IA Belgium/Flanders highlights that both of its IMs are needed to address timely societal and ecological needs and to bring together stakeholders with different and often opposing interests, who do not have other opportunities to cooperate and generate win-win solutions. The IA's Spain/Basque Country motivations relate to the sustainable management of forests and resources, and to promoting forest multifunctionality and rural development through PES. The motives behind the IM of the IA Spain/Catalonia are about introducing the forest-water link into high-level legislation (Urbanistic Masterplan of a Water Reservoir - PDU) and establishing a step for other similar PES initiatives to succeed in the area enabling and supporting the cooperation amongst the water, forest and tourism sectors. For the Finnish IM, the IA reports as motivation the need for i) generating markets for ES in the area in order to provide incentives to private landowners and the tourism industry to secure landscape values and ii) solving conflicts linked to the use of forests for industrial purposes. The one-time concession permits IM of IA Croatia, was motivated by similar experiences from other countries and the currently enabling legislative context and could ultimately contribute to the maintenance and protection of the Medvednica Nature Park. Through its IM, the IA Denmark aims at responding to the need for substantially advancing innovative policy mechanisms and business models for the payment for and provision of FES in Denmark through stimulating participation among forest owners, improving the coordination of nature conservation, and using new knowledge on the likelihood of finding red-listed and endangered forest flora and fauna species in Danish forests. Italy/Borgo's IM is driven by a purely business-economic motivation of increasing the commercialization of an existing service of mushroom-picking permits and enhancing the service while reducing the transaction costs. The Italy/Etifor IA built its IM to address the lack of funding for protected areas, the need to preserve ecosystems, manage land-use conflicts, and fulfil certification standards. The IA Peru developed an IM that is framed by a new law on payment for hydrological ecosystem services in Peru and is very relevant for the communities and institutions on the site, while raises important questions regarding its implementation modalities that could be addressed through the pilot project. Through its IM, IA Russia aims at responding to challenges created by the current legislative context and at resolving conflicts between lessees of conflicting FES, creating new markets for ES, and providing incentives to maintaining and enhancing ES in the long term. IA Switzerland seeks to respond to a general and widespread problem throughout the country for different uses and practices and to create a possible leverage effect for forest owners/forest enterprises.

4.2.3 Common sustainability strengths and challenges among IAs

The analysis of the screening tool's findings permitted the identification of common sustainability strengths and challenges among the IAs. These were shared with all the research and practice partners during the Co-Design Event in January 2019 providing collective feedback to the IAs, enabling further exchanges, and creating a co-learning environment.

Common sustainability strengths

Common strengths among IAs include:

- The IAs are timely and relevant in their current contexts
- Several IAs show clear upscale potential for other regions with similar challenges
- Several IAs have adopted a promising holistic perspective by:
  - addressing bundles of Ecosystem Services
  - focusing on cooperation and governance
  - building on cross-sectoral approaches
  - integrating the IM in a broad territorial development perspective
- Several IAs are highly creative in their IM design, in terms of potential mechanisms but also regarding the design process:
  - setting wide participation and co-creation as a priority,
  - searching for the necessary professional support on specific tasks and knowledge when needed
- Often, there is ambition in the IA and its goals
- Some IAs seem to have the potential to address existing conflicts or tensions

Common sustainability challenges

The identified common challenges can be organized into **eight challenge categories**. Below we go through each of the challenge categories presenting their relevance and key questions they connect to, propositions on ways to overcome them according to the research partners of WP3 and examples from IAs illustrating the challenges – the way these were presented as feedback to the IAs' partners during the Co-Design Event.

Challenge 1: Finding the optimal socio-ecological scale of analysis, planning and action
Key question: 'How to integrate the IM in a broader territorial vision and sustainability goal?' Reflecting on the socio-ecological scale of analysis, planning and action is important for addressing this question and for effectively anticipating and monitoring the IA's impact in terms of social equity, ecology and geography.
Suggestions: ▪ Take into account both direct and indirect impacts of the IM on diverse actors (e.g., locals versus tourists, individual users versus companies with profitable business, small versus large forest owners, etc.) in order to anticipate unequal or unfair balance of impact/ costs - benefits and potential tensions or conflicts. ▪ Investigate and think in terms of bundles of ES and trade-offs with ES other than the focal ES. ▪ Take into account the impact of the IM on broader societal controversies, and vice versa, impacts of other land planning initiatives on the IM, in order to anticipate challenges and tensions on a larger scale than the local context of the pilot project.

Examples: In the Danish case, there could be an indirect impact on local wood industry actors if the IM provokes a radical decrease in wood harvesting that should be considered. The Belgian/Flanders IA should engage with the controversies around hunting and the role of hunters in nature management, while the Finland IA with the controversies related to fauna disturbance and negative impact of public access on biodiversity. The Italy/Etifor IA partners need to consider the potential trade-offs of a strong focus on mycosilviculture as well as associated positive impacts on other ecosystem services.

Challenge 2: Identifying the relationship between management and ecosystem services
Key question: 'What is the real change of the management and the resulting change in ecosystem services? What is the relation between the suggested management and ecosystem service? Is the relationship documented? Can it be quantified?'
Suggestions: ▪ Clearly describe the change in management and the expected changes in ecosystem services ▪ Address the needs for broad ecosystem services valuation integrating biophysical, economic and socio-cultural values, and for an ecological diagnostic of the identified main issues that the IA will address ▪ Strengthen the collaboration with the scientific partner, ask for support from thematic expert in the IA organization or institutional environment, look for rich ES data environment, other similar initiatives
Examples: IAs have been encouraged to study the specific links between management measures and their impact on ecosystem services (Spain/Catalonia), or between biodiversity (Denmark) or landscapes (Finland) and ES at the local scale. Others received suggestions about studying the legal implications and obstacles, induced change of rights and property status (especially for reverse auction cases, Belgium and Denmark), or social aspects such as social preferences in order to democratically set priorities and assess demand for ecosystem services.

Challenge 3: Meeting the goal of participation and reach out across societal sectors when time and motivation are limited
Key question: 'How to secure continued participation and inclusion of all relevant stakeholders, ensure their necessary support and keep motivation high?'
Suggestions: ▪ Plan in advance and set dates in a consensual manner (i.e., MAG meetings) ▪ Keep the participatory processes democratic, consider all voices' needs and by doing so avoid disengagement ▪ Put specific emphasis on engaging those stakeholders that are critical for the success of the IM (in many cases from a different policy sector) ▪ Anticipate diverging stakeholder interests and ways of thinking, and work bridges between potential conflicts between objectives or interests between different key stakeholders (i.e., frictions between research and action objectives).
Examples: These suggestions should be relevant for many IAs as many of them expressed dealing with this challenge. For instance, in the words of the IA partners from Croatia: 'Difficult to attract stakeholders to actively engage, as they are volunteers and don't have much time to deal with topics like this';

Belgium/Flanders: 'Lack of resources for broad participation in MAG meetings (time, funds)'; Finland: "some stakeholders cannot attend full days meeting'; Switzerland: 'it would be quite bad if the 'competitors' are invited to the MAG meeting. However, for the context of a case-study in SINCERE, it would be good to invite them, as this is what is in accordance to the procedures of SINCERE project'

Challenge 4: Consider economic transactions and economic potential
Key question: 'Ensuring the potential economic aspects of the IM with regard to transactions, donations, costs of changed management, etc.'
Suggestions: ▪ Consider cost of management change and who will pay for implementation ▪ Public good effects – who benefits from management change ▪ Describe any generated flows of money (cash). ▪ Consider and describe Upscaling potentials ▪ Work with science partners – Donations/voluntary payments, see e.g., List & Lucking-Reily (2002), or Karlan et al (2007), CSR
Examples: The IAs have been encouraged to further reflect on the economic aspects involved and to identify clearly the stakeholders and the parties in the foreseen transactions. For instance, the Belgium/Flanders IA partners are encouraged to reflect on who will benefit from the measures targeted by the auction and consequently who will be invited to bid and who will provide most funds. Similarly, Croatia needs to better assess the beneficiaries and Finland to explore how donations can be further encouraged.

Challenge 5: Coping with time and resources constraints
Key question: 'How to design and successfully implement the desired IM in a context of limited time and resources?'
Suggestions: ▪ Lean on existing initiatives and try to match them with the goals and resources for your IM ▪ Seize opportunities to work in local contexts where there are already local governance schemes well-functioning. This might enhance the success potential and sustainability over time if properly integrated. ▪ Design a roadmap to implementation
Examples: The Spanish/Catalonia IA would profit from strategic planning through the ongoing process for the development of the urbanistic director plan. The Belgium/Flanders IA could possibility select areas where there are hunting units for the pilot projects. For Finland, it is suggested to find inspiration or lean on existing initiatives in the area: very local land use agreements already done between private owners and nature tourism enterprises.

Challenge 6: Securing additionality aspects

Key question: 'Ensuring the additionality aspects of the IM: the IM has to ensure an improvement beyond current practices and context and cannot enable continuation of "business-as-usual"'
Suggestions: ▪ Consider if there are any additionality by looking at whether the IM will impact scale or security for provision, etc. ▪ If not, consider how focus can be changed to ensure additionality.
Examples: The IA partners from Russia were invited to consider: How could the new legislation ensure that the management choices will be different and evolve towards enhanced multifunctionality? For Italy/Etifor, practice partners were encouraged to reflect on the question: Does the payment and contracts with the poplar growers result in a change in land use, which would not have happened in the absence of this PES?

Challenge 7: Facing frictions and mismatches with existing legislation, policies and subsidy systems
Key question: 'How to design, develop and implement a new IM considering potential frictions with existing legislation, policies and other contextual issues?'
Suggestions: ▪ Mapping of existing relevant legislation and how it influences the way the IM will operate (legislation defines scope for action) ▪ Identify further policies (e.g., subsidies) that impact the scope of the IM ▪ In the short term, think on innovative ways to bridge your IM with existing policies, projects and programs ▪ In the mid- and longer term, engage in improving the policy framework through respective feedback to policy makers
Examples: For Belgium/Flanders, it was suggested to explore how the IM could be implemented around areas with protection status. For Denmark, the potential interference with flat-rate subsidy mechanisms and other legislation was also suggested to be taken into account.

Challenge 8: Fostering societal inclusion and enhanced awareness
Key question: 'How to guarantee the goal of societal inclusion and enhanced awareness as a pre-requisite and also as an expected outcome of the IM?'
Suggestions: ▪ Participation, dialogue and open communication ▪ Sensitivity to context, local culture and plurality of values underlying ES, biodiversity and places in which IM are designed and implemented. ▪ Attention to and coherence with local history and culture related to the targeted ES, as a fundamental pre-requisite for sustainability and equity.
Examples: To address this challenge, and considering that the fact that nature is free in Finland is of high relevance, it was suggested that the Finland IA targets the actors who directly profit from the touristic use of landscapes and could be more willing to make a financial investment. In Switzerland, on the other

hand, the IA partners have a clear vision on the meaning of the actions in the IA and their coherence and this is particularly important when dealing with this kind of cultural ecosystem services.

4.3 Framework for the sustainability self-assessment protocol

4.3.1 The Principles-Criteria-Indicators framework

Although a large number of standards to assess the sustainability of forest management already exists, the specificities of the innovative mechanisms developed in SINCERE required a specific sustainability assessment framework. First, IMs are very diverse and go beyond forest management as they include novel policies, governance schemes and business models, and focus on ecosystem services. Therefore, there is a need for a broader framework. A framework that merges the sustainable forest management approach with the ecosystem services concept, and encompasses policy analysis and business social responsibility. Secondly, the SSA protocol should include a dynamic dimension: it will be used to assess processes and not merely outcomes. The SINCERE SSA protocol is based on a framework that adopts the hierarchical Principles-Criteria-Indicators framework for the formulation of sustainable forest management standards by Lammerts Van Bueren and Blom (Tropenbos Foundation 1997, Figure 5).

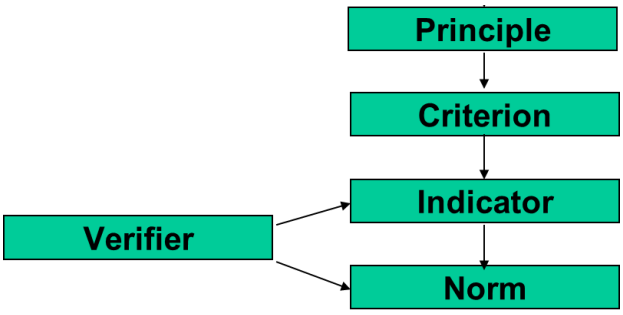

Figure 5 The hierarchical Principles-Criteria-Indicators framework by Lammerts Van Bueren & Blom (Tropenbos Foundation, 1997)

A **principle** is an accepted fundamental rule of sustainainable development, formulated as a commandment.
A **criterion** describes the state of the system under compliance with a principle, formulated to allow a verdict.
An **indicator** is a variable indicating the level of compliance with a criterion.
A **norm** or **threshold** is a well-defined indicator value setting the boundary between compliance and non-compliance to a criterion.
A **verifier** is a tool or instrument to measure an indicator.

The Principles and Criteria have been co-defined with SINCERE practice partners through the process described in section 4.1. The Principles and Criteria selected are presented in the following section (4.3.2). Indicators have been selected by each IA partner, based on their local relevance and availability through a process described in section 4.3.3. Those have been reported in detail in Appendix 3 of D3.3 together with the responses of the IAs to the SSA tool.

4.3.2 Principles and Criteria selected

According to Prabhu et al. (2001), sustainability standards in the forestry sector should be adapted to their scale of application. There is also a need to adapt them to the specific geographical context in biophysical and socio-economic terms (Holvoet and Muys, 2004). According to the guidelines in the Tropenbos Hierarchical Framework (Lammerts van Bueren and Blom, 1997); a standard should be horizontally and vertically consistent. A standard is horizontally consistent when it contains all the necessary elements of SFM, without overlap or duplication. Vertical consistency implies that every element is placed at the proper

hierarchical level, and is correctly linked to the corresponding elements at other levels (Holvoet and Muys, 2004). In this perspective, WP3 Task 3.2 researchers compared and completed the list of Principles and Criteria collectively defined during the SINCERE General Assembly in January 2019 with insight from scientific and grey literature to come to a full and consistent list of Principles and Criteria. This list was then sent for potential modification and final consent from all SINCERE partners before adoption as the SINCERE sustainability standard. The literature taken into account to develop the principles and criteria includes FSC®, 2015; PEFC, 2020; Jacobs et al., 2016; Pintér et al., 2018; Quine et al., 2013; Sustainable Northern Ireland, 2016; and Villeneuve et al., 2017. The selected principles and criteria are as follows:

Ecological sustainability
Principle 1: The IM shall preserve and/or enhance the ecosystem structure, including stand structure and biodiversity *Criterion 1.1:* The IM maintains or restores forest cover and standing stock of biomass (= zero deforestation and sustained level of living biomass). *Criterion 1.2:* The IM maintains and protects biodiversity in its widest sense, including gene diversity, species diversity and landscape diversity. *Criterion 1.3:* the IM maintains and enhances forest vitality, including increased resilience to drought, fire, storm, pests and diseases and other disturbances.
Principle 2: The IM shall preserve and/or improve ecosystem functions Criterion 2.1: The IM preserves/enhances the ecosystem functions that are ensuring its long-term vitality and productivity, and its flow of ecosystem services, including closed biogeochemical cycles, continued carbon sequestration, erosion control, control over water fluxes, pollination, etc.
Principle 3: The IM shall have a holistic approach for its design, planning, implementation and monitoring phase, considering the appropriate spatial and temporal scales, and considering impacts inside and outside the area of focus, on short and long terms. *Criterion 3.1:* The IM favors landscape approaches with a harmonious integration of different land uses (different forest types, agriculture, wetlands) in the provision of the targeted ES within the focal area. *Criterion 3.2:* The IM also ensures ecological sustainability along the further value chain (e.g., carbon balance of the further product cascade). *Criterion 3.3:* The IM should identify, keep a close eye, and report critical ecological indicators and thresholds. *Criterion 3.4:* The IM should identify and avoid any potential negative environmental impact inside or outside the focal area, on short term or long term.

Social sustainability
Principle 4: The IM shall be broadly accepted. *Criterion 4.1:* Participation is ensured at all stages of the IM development process to strengthen its legitimacy and relevance. Priority setting and assessment of ecological, cultural, social and economic values are done in a participatory way, agreed with the stakeholders. *Criterion 4.2:* The IM strives to meet a defined goal that is understandable and acknowledged by all stakeholders.

Principle 5: The IM shall contribute to improve community relationships and enhance social capital in the region. *Criterion 5.1:* The IM development process enables and ensures the involvement of a diversity of actors and values. *Criterion 5.2:* The IM includes mechanisms to ensure efficient, free and fair communication between stakeholders, taking into account the potential impacts of power relations within and between stakeholder groups on the deliberations as well as on access to them. The IM identifies, prevents and when necessary, addresses tensions or conflicts. *Criterion 5.3:* The participatory process aims at fostering the emergence and sharing of common understanding and common values, and ensure a coherence between those values and the actions planned in the IM. *Criterion 5.4:* The IM includes the recognition of each actor's role in forest and ES governance and strive for awareness and recognition of co-responsibility.
Principle 6: The IM shall promote equitable solutions or alternatives, that trigger/stimulate new forms of coordination and a culture of negotiation including all relevant actors. *Criterion 6.1:* The IM aims at realizing equity in access to the IM (e.g., between big and small forest owners). *Criterion 6.2:* The IM aims at equity in access to the enhanced ES provision or quality, and maintains or enhances access to the other products/services the forest provides. *Criterion 6.3:* The IM aims at equity in the distribution of (economic) benefits/income and costs. It aims at a balanced delivery of both public and private benefits.

Economic sustainability
Principle 7: The IM shall be economically viable in the long-term *Criterion 7.1:* The IM creates new sources of income for forest ES provision (quality and quantity). *Criterion 7.2:* The IM is cost-efficient, economically viable and, when possible and relevant, profitable. *Criterion 7.3:* The IM aims at synergies and avoids or reduces harmful trade-offs between the targeted ES and other ES. It aims at creating bundles of ES including those that are not easily quantified and monetized. *Criterion 7.4:* IM contributes to the local economy and improves the conditions of local communities, by supporting local economy's development, diversification and resilience.

Institutional sustainability
Principle 8: The IM shall be designed and implemented through an integrative, inclusive and iterative process. *Criterion 8.1:* The IM aims at cross-sectoral coherence, by embedding it in a broad territorial vision and plan, that matches local history and culture. *Criterion 8.2:* The IM is based on an integrated assessment of all environmental, social and economic values. It builds upon a strong scientific basis that combines a set of appropriate methods and disciplines to obtain comprehensive and acceptable valuation results. It considers how decisions will accommodate incomplete valuations of ES.

Criterion 8.3: The IM includes a learning mechanism, which feeds the outcomes of this analysis back into the implementation process. *Criterion 8.4:* The IM design and implementation process is characterized by inclusiveness. The IM achieves inclusion of stakeholders in knowledge production and IM design, to include hidden social-ecological values, deal with power asymmetries and improve societal relevance of the valuation and the IM.
Principle 9: The IM shall deal with sustainability risks internally or through existing institutions. *Criterion 9.1:* A dedicated governance platform/committee/representation is operational to review the process, manage sustainability risks or tensions, and address complaints from concerned stakeholders.
Principle 10: The IM shall align with democratically set priorities and legal frameworks. *Criterion 10.1:* The IM complies with existing laws, and where relevant, with customary and traditional rights. *Criterion 10.2:* The activities carried out through the IM are consistent with the rules and targets of the (public) funding which it uses (conditionality criteria are met). It aims as well at synergies with other public funding efforts mobilized in same the area and domain. *Criterion 10.3:* The IM demonstrates added-value or an improvement beyond current practices and context and when necessary, a discontinuation of "business-as-usual".

4.3.3 Process of Indicators selection

The development and selection of sustainability indicators was an important part of the formulation of the framework for SSA, demanding close collaboration between practice and research partners. As mentioned in section 4.1, the indicators were selected by each IA partner, based on their local relevance and availability and were fine-tuned through individual feedback and discussions with the research team. In this section, we present in more detail the evolution of this close collaboration.

In the second semester of 2019, IA partners identified and drafted with our guidance a list of indicators, relevant for their IA area and fit to indicate the level of compliance with each sustainability criterion. This task was done with the support of the key local stakeholders and of their research partners. KU Leuven, as the coordinator of this task, maintained regular contact through emails with IA leads in order to ensure completion of IA's set of indicators and provided support when needed (see Milestone 21). During the fall of 2019, after receiving indicators sets for each IAs, we performed a first review of their indicators. In December 2019, we organized, prepared and facilitated a work session during the SINCERE General Assembly, with IA and research partners on a preliminary sustainability assessment of all SINCERE cases. IA partners were asked to identify and carry out a first analysis of their IAs' main strengths and challenges in terms of sustainability. Results were presented and discussed in small groups during the General Assembly. Main issues were recorded to be included in the individual feedback that was under preparation regarding their indicators set. Throughout 2020, we carried out several rounds of feedback and improvement of each IA's indicators set, finalized the sustainability tool's design, created report templates and sent them to the partners to perform their self-assessment. On January 6, 2020, we organized a meeting with all WP3 partners to discuss each IA's progress and coordinate the feedback on indicators when needed (specifically coordination with the University of Copenhagen UCPH on economic indicators). From mid-January to March 2020, we created a template for and wrote a first draft of the individual feedback on sustainability indicators.

In August and September 2020, the first round of feedback on indicators was finalized and sent out to each IA partners. In October 2020, we finalized the sustainability tool's design and created self-assessment report templates with detailed instructions, sent to each IA partners. Meanwhile, IA partners reviewed their indicators sets. Throughout November and December 2020, we performed a second round of feedback on indicators selected per IA, and when needed carried out the third round of comments.

Section 4.4 reports on the format of the SSA tool including the indicators. The indicators selected and used by each IA have been reported in Appendix 3 of D3.3.

4.4 Ex-post sustainability self-assessment: tool and findings

4.4.1 The sustainability self-assessment tool

The final step of the transdisciplinary process towards a full sustainability assessment of the IM refers to the reporting of the IAs' using the SSA tool. The SSA tool was co-developed by practice and research partners according to the protocol and the PCI framework described earlier (sections 4.1-4.3). Eventually, in 2020, we designed two templates to be used to report the results of the SSA. **The SSA tool is composed of an excel document for the application of the sustainability indicators for each IA, and a questionnaire for comments on the indicators and for reporting the SSA result for all sustainability dimensions (reported in Appendix 2 of D3.3).** In the excel, for each of the four sustainability principles, practice partners are called to i) apply their sustainability indicators to measure the performance of their IA, ii) identify a sustainability threshold for every indicator, and iii) attribute a sustainability score by comparing every indicator with the threshold. Once all scorings are given, a spider web chart is automatically generated and provides a visual representation of the SSA. The questionnaire is organized into five (5) sections and was designed to guide the IA partners in reflecting upon i) the fulfilment of their most important sustainability goals, (ii) the lessons learnt from integrating sustainability concerns in their IA, and (iii) potential actions of improvement towards more sustainable innovation. After the reception of the IAs' reports, the whole process concluded with a round of Skype interviews between the research and practice partners for clarifications and to deepen the sustainability analysis. Those interviews took place in March 2021. The lessons learned from this SSA were discussed at the Internal Synthesis Workshop (May-June 2021), and will be further used in WP4 to formulate recommendations for future IA.

4.4.2 Sustainability self-assessment results per IM

In this section, we go through the SSA results per IM according to the findings of the SSA tool (see Appendix 3 for the full responses and the IAs' indicators). For each IM we present its spider web chart and highlight its phase of preparation or implementation; its main sustainability targets; the overall sustainability appreciation by the partners; its strongest and weakest points; and the main actions needed to improve sustainability. This information is based mainly on the 'Identity of the innovation action' and 'overall sustainability assessment' parts of the questionnaire' and includes what the IAs have chosen to highlight. Then, we report on the main points for each sustainability principle (ecological – social – economic – institutional dimension of sustainability). The 'tick' refers to a point generally positive for the IA's sustainability, while the 'square' is neutral to a negative point. It should be mentioned that in this section we do not aim at comparing the sustainability of the different IMs. Instead, the purpose of this section is to

provide reflective spaces for contemplating the sustainability of each IM in its particular setting, ways of improving it, and extracting some lessons learnt. It is for this reason that we have chosen to report the full SSA case by case, instead of organizing the findings into a tabular format principle per principle. It is worth noting that this section is a significantly updated version of section 4.4.2 of D3.3. First, the findings for Spain/Catalonia IA are reported here for the first time as they were not yet available for D3.3. Second, the results presented have now been updated and fine-tuned by all practice partners. Third, practice partners have now provided testimonies on the IM development process, which are included in Boxes and presented together with the SSA results per IM.

Belgium/Flanders – Reverse auction for habitat restoration and improvement in forested hunting areas

This IM is in the mature phase of implementation. As many of the selected biddings have yet to be implemented, the SSA refers to the reverse auction process and to the expected outcomes of the selected biddings. In terms of sustainability targets, the IA aims especially at preserving and/or enhancing the

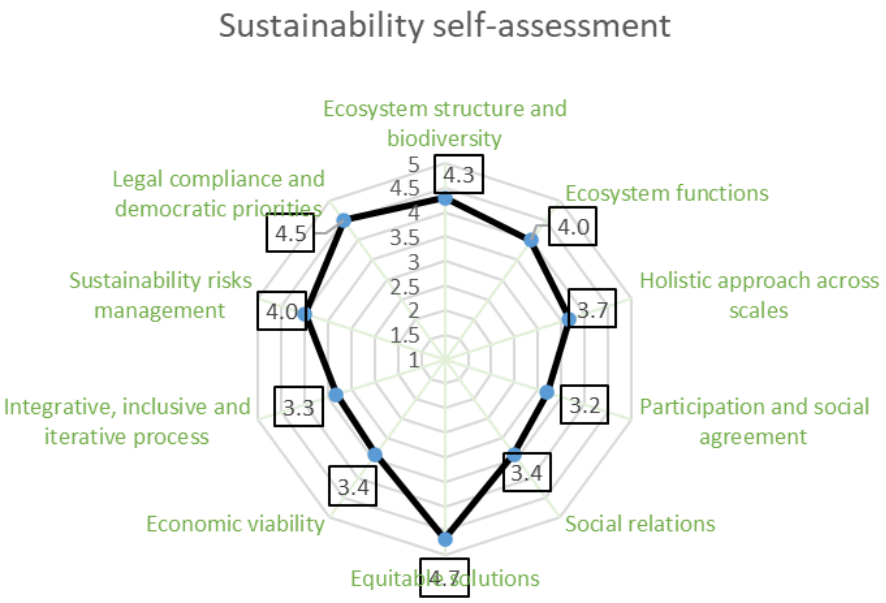

Figure 6 Spiderweb synthesis of the sustainability self-assessment for IA Belgium/Flanders (habitat restoration)

ecosystem structure and function and at a cost-efficient, economically viable and – when possible – profitable IM. The overall sustainability reached by the IA is assessed as positive (Figure 6) and the results of the assessment seem to match the main sustainability targets and expectations of the IA at this stage. The IA considers the strongest point in terms of sustainability to be the (expected) improvement of the ecosystem structure and biodiversity. The weakest point is its limited scope in terms of time, funding, number of FES and participating stakeholders. Actions to improve sustainability include: i) follow-up of the selected projects over the next year (mid-term action), and, in case of positive evaluations, ii) drafting of guidelines on how to organize a reverse auction in the context of nature conservation with focus on more comprehensible and targeted communication to the relevant stakeholders.

Ecological dimension of sustainability

- ✓ Improvement and restoration of forest cover, standing stock of biomass, biodiversity, forest vitality and many ecosystem functions e.g., biogeochemical cycling and continued carbon sequestration.
- ✓ Enhancement of the natural values in the forested hunting areas will benefit game species, endangered species and vegetation.
- ✓ The demand for maintenance of the results for at least ten years ensures longer-term impact.
- ✓ The IM is built to avoid negative environmental impacts.
- The IA foresees harmonious integration of different land uses (hunting and nature conservation). Improvements could be considered through the integration of other forms of recreation such as hiking, and potentially a more ambitious focus on nature conservation.
- The monitoring and the reporting are sufficient regarding the implementation period of the project. Longer-term outcomes or impact will be difficult to monitor.
- The main challenge is the reconciliation of the time-scale mismatch between the short duration of the project and the long-term character of ecosystem/biodiversity improvement actions and their impact.

Social dimension of sustainability

- ✓ Participation of the important partners and stakeholder representatives (i.e., the public sector, hunters, farmers, forest owners) was ensured throughout the entire process.
- ✓ The participatory process fostered common understanding and values despite the disparate interests.
- ✓ Relationships especially between hunters and forest owners might improve.
- ✓ Equity of distribution of (economic) benefits and costs is at the heart of the IA. Both private and public benefits can be expected. Measurement of cost-efficiency will be needed.
- The limited room for adjustments in the IA's pre-determined framework constrained participation.
- The nature conservation sector had limited participation and only in the early stages.
- Equity of access is generally believed to have been achieved but the current mechanism might favour those with access to support from consultancy firms.
- The IM was sometimes perceived as complex to comprehend possibly hindering access to participation. Since the reverse auction was tested as a way to simplify procedures further reflection is needed on this.
  The outreach to the broader stakeholder groups (individual forest owners or hunters) was planned to be done through the channels of the representative groups, however it has been limited in practice.

Economic dimension of sustainability

- ✓ The IM did activate a new source of funding for FES provision, drawing upon the hunting fees in the Jachtfonds (Flemish Hunting Fund), established coincidentally with the start of SINCERE. This can be a long-term source of funding to meet societal demands for FES.
- ✓ The IM can be and is designed to target the ES in demand, even when more are targeted
- ✓ The IM benefits the wider society also locally, through the provision of the ES.
- In a strictly monetary sense, the IM is not of major significance for the local economy as it is a limited payment for an action of a small scale.
- The IM may be adapted to increase access, and hence value for some forest users, however, as rightly pointed out by the IA partners, this may reduce supply through enhancing perceived costs on the forest owner side.

- The team assesses that the transactions cost of setting up and running the IM has been large compared to the impact of the contracts signed and implemented. It is an open question, from the assessment, if part of this can be fixed costs, and hence less important at larger scales.

Institutional dimension of sustainability

- ✓ The participatory process includes representatives of all the relevant stakeholder groups, except for the nature conservation sector. This allowed incorporating local knowledge, values, concerns and ideas of the stakeholder groups into the IM.
- Although the IM shows potential, it faces bureaucratic challenges. Unless more testing is done with positive results, it is doubtful that policymakers will decide to make such a change in the use of public funding.
- Bureaucratic procedures for existing subsidy schemes reduce the necessary flexibility needed for succeeding with such an IM.

Belgium/Flanders – Reverse auction for wild boar buffers

This IM was in the preparatory implementation phase (implementation of reverse auction call) but has been terminated before creating any wild boar buffers. Thus, the SSA refers only to the reverse auction process including only general indicators. The IA aims at i) a cost-efficient, economically viable and, when possible and relevant, profitable IM, ii) alignment with democratically set priorities and legal frameworks, and iii) promoting equitable solutions that stimulate new forms of coordination and a culture of negotiation including all relevant actors. Overall, the self-assessment provides a positive image especially in terms of economic and institutional sustainability (Figure 7), which shows that the theoretical design was well done. In practice, the cost-efficiency of the mechanism was not proved and the IM missed to receive institutional approval. This constitutes the IM's weakest point in terms of sustainability. The IM's strongest point instead is the fact that it seeks to meet a defined goal that is understandable and acknowledged by all stakeholders, and to address an existing and explicit need in finding simpler alternatives to traditional subsidy mechanisms. Actions to improve sustainability include: i) adjusting the requirements for the wild boar buffers including

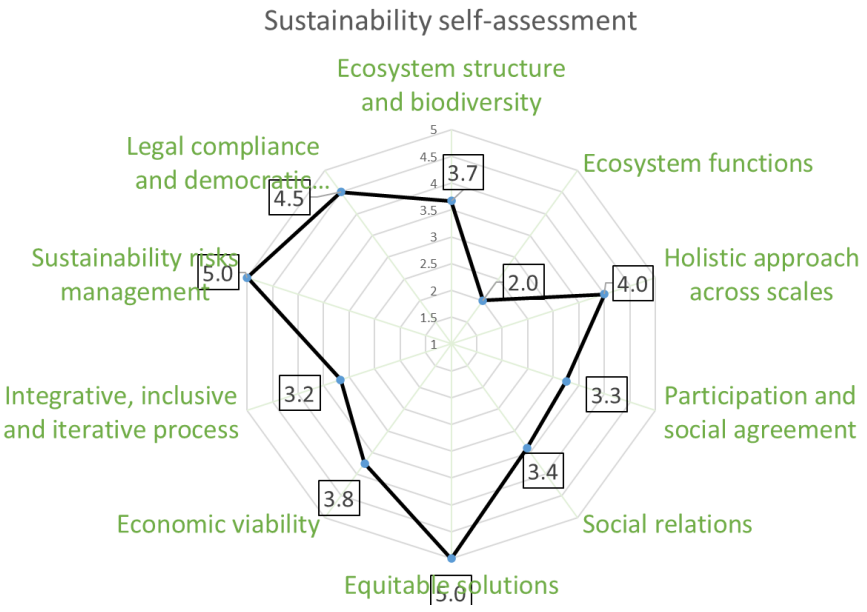

Figure 7 Spiderweb synthesis of the sustainability self-assessment for IA Belgium/Flanders (wild boar buffers)

contribution to restoration of vegetation and habitat and to public benefits, ii) improving the participatory process with more room for manoeuvre regarding the framework, engaging more stakeholders, and providing more comprehensible and targeted communication, iii) measuring the cost-efficiency of the IM.

Ecological dimension of sustainability

- ✓ Contribution to the control of the population of wild boar, reduction of the impact of wild boar and agriculture on forest edges and complexes.
- ✓ The IM ensures the preservation of the ecosystem structure, including stand structure and biodiversity.
- ✓ Enhancement of biodiversity through the creation of strips of grass or other low vegetation.
- ✓ Prohibition of the use of pesticides on the wild boar buffers.
- ✓ Safeguarding of forest vitality through the ban on pesticides on the wild boar buffers.
- ✓ The pesticide-free wild boar buffers would integrate different land uses harmoniously, namely agriculture, hunting and nature conservation.
- ▪ Ecosystem functions that ensure vitality, productivity and ecosystem services would be enhanced but the IM is lacking on the long-term aspect.
- ▪ Improvements could be considered by adjusting the requirements for wild boar buffers to include more public benefits.
- ▪ A challenge is the integration of ecological concerns into the design of the IM since too restrictive conditions for the wild boar buffers would lead to disengagement from the farming sector.

Social dimension of sustainability

- ✓ Participation of most of the important partners and stakeholder representatives (i.e., the public sector, hunters, farmers, forest owners) was ensured throughout the entire process.
- ✓ The participatory process fostered common understanding and values despite existing tensions.
- ✓ Relationships especially between hunters and farmers might improve.
- ✓ Equity of distribution of (economic) benefits and costs is at the heart of the IA. Both private and public benefits can be expected. Measurement of cost-efficiency will be needed.
- ✓ The IM identified win-win solutions for all. Hunters and farmers remain convinced of the IM's necessity.
- ▪ The IM was sometimes perceived as complex to comprehend. Since the reverse auction was tested as a way to simplify procedures further reflection is needed on this.
- ▪ The nature conservation sector had limited participation and only in the early stages.
- ▪ There was limited room for adjustments in the IA's pre-determined framework.
- ▪ Equity of access is generally believed to have been achieved but the current mechanism might favour those with access to support from consultancy firms.
- ▪ The outreach to the broader stakeholder groups could be improved.

Economic dimension of sustainability

- ✓ The IM did activate a new source of funding for FES provision, drawing upon the hunting fees in the Jachtsfond, established coincidentally with the start of SINCERE. This can be a long term source of funding to meet societal demands for FES.
- ✓ The IM can be and is designed to target the ES in demand, even when more are targeted, e.g., hunting and biodiversity protection.

- ✓ The IM could have local economic positives through the higher value of hunting and lower losses from wild boars in farming.
- ✓ The IM appeared too complex in structure and the joint benefits across the different bidders perhaps too difficult to explain, and as a result supply of bids was too low.
- The IM may be adapted to increase access, and hence value for some forest users, however, as rightly pointed out by the IA partners, this may reduce supply through enhancing perceived costs on the forest owner side.
- The team assesses that the transactions cost of setting up and running the IM has been large compared to the impact of the contracts signed and implemented. The weak supply of bids suggests that the bidding itself also implied too much uncertainty and/or too high transaction costs.

Institutional dimension of sustainability

- ✓ The IM demonstrates added-value, as it aims to fill a gap in public funding for nature governance.
- ✓ The participatory process includes representatives of all the relevant stakeholder groups, except for the nature conservation sector.
- The limited results of the biddings did not provide a sufficient basis to prove the cost-efficiency of the mechanism, leading the inspector of finance to give a negative advise on the continuation of the project.
- It is not clear whether the IM adheres to the public funding rules. Its cancellation is due to doubts about its compliance to or its violation of the *"zuinigheidsbeginsel"* (you cannot pose an unnecessary burden on the public budget).

Box 1 – Testimony IA Flanders/Belgium, Alexander Therry (Project officer): Reversed auctions: from a promising theory to partial success

Once designed, the reversed auction mechanism offers an important potential to reduce administrative and transaction costs. The process of selecting bids based on the first rejected price approach (used for the IM wild boar buffers) is very straightforward and quick for services that are easily comparable and for which the price can be used as the primary selection criterion. However, despite several efforts to ensure institutional approval for the experiment, the process for the wild boar buffers was stopped just before we would start contracting the selected bids. We sought legal advice and brought in additional legal support in order to make sure that the design was legally acceptable. High level representatives of the IA partner (Natuurinvest) and the main public administration (ANB) had bilateral meetings with – amongst others – the Inspector of Finance, in order to explain right from the beginning the logic of the reversed auction process. Initial approval was obtained, so the experiment could start. We finalized the design phase and published the call for the reversed auction. The response, however, was lower than expected. Stakeholders explained this lack of response by the complexity of the logic of the price setting through the first rejected price approach, the reluctance of the target group to engage in an unknown process, and the communication actions by the IA partner and the stakeholders that failed to reach sufficiently the potential bidders. After a second run, the reversed auction for wild boar buffers resulted in 8 bids, which allowed to calculate a first rejected price. However, 8 bids were not enough to demonstrate the full potential benefit (value for money) of a reversed auction by first rejected price. Once the selection was made and contracts were submitted for approval, the Inspector of Finance – despite the initial approval – gave a negative advice and the experiment was interrupted. Without having sufficient evidence to show that the overall exercise could be economically interesting, the Inspector of Finance considered that it was not acceptable to use public funds to pay a higher price than the price asked for by the bidders.

Cancelling the wild boar buffers experiment has caused quite some frustration amongst IA partners and stakeholders. It has also reduced the enthousiasm felt with the relative success of the other reversed auction for

habitat restoration in forested hunting areas. This second experiment resulted in 15 approved proposals that are currently starting their implementation. However, the discriminatory auction approach used for this experiment is seen as more similar to traditional call for proposals or call for tenders, therefore less innovative than the one based on the first rejected price principle and as such, considered less as a breakthrough than would have been the case with the first rejected price approach.

Spain/Basque Country – Forest management for timber, landscape and water services

This IA is implementing its pilot IM project with the IM thus being in the developed phase of implementation. In terms of sustainability targets, the IA aims especially at increasing water quantity, ensuring water quality and improving landscape related ES. The overall sustainability reached by the IA is assessed as generally positive since the results of the assessment seem to match the main sustainability targets and expectations

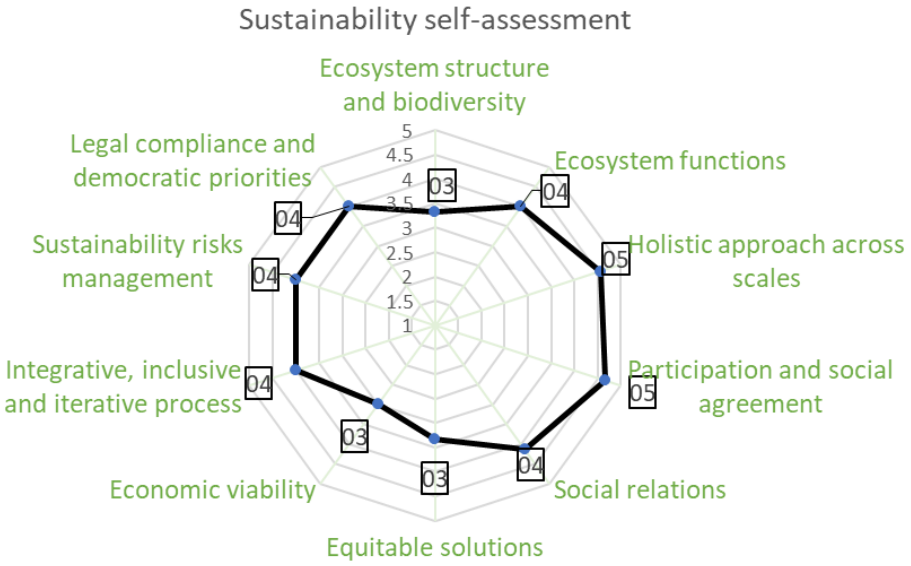

Figure 8 Spiderweb synthesis of the sustainability self-assessment for IA Basque country

of the IA at this stage (Figure 8). The IA considers the strongest point in terms of sustainability to be the successful social participation of the local community in the development of the pilot project. The weakest point refers to the financial aspect, the challenges and difficulties related to seeking and securing long-term funding for the payment of the ecosystem services. Actions to improve sustainability include: i) search for new PES that until now were not quantified (short-term), ii) find new outlets for timber in markets to which it has not been destined until now (hardwood, native broadleaf species, etc. – medium-term), and iii) achieve the combination of payment for ecosystem services and different markets for different timber and species in a stable and continuous manner (long-term).

Ecological dimension of sustainability

- ✓ The IM enables a change of trend, both in the choice of species and in the choice of the silviculture to be used, as well as longer shifts and less environmentally impactful management.
- ✓ The IM has a clear focus on enhancing water flow and landscape aspects.
- ✓ The IM remains in the early stages but is attentive to its long-term ecological impacts.

- For the rest of the ES (beyond water and landscape), the IM shows limited interest and aims at maintaining them at minimally optimal levels.
- The IA highlights that while it is possible to measure the IM's ecological values and even quantify them, it is difficult to achieve a fair and long-term payment.

Social dimension of sustainability

- ✓ The IM is responding to current social concerns of a community with a long tradition of forestry, which was at a crossroads as to how to continue this tradition and avoid forest abandonment.
- ✓ The IA tried to ensure the participation of as many people as possible from different areas related to the forestry sector (forest owners, universities, research centres, administrations etc.) in order to obtain a holistic view and to integrate all possible concerns and worries.
- ✓ The IM is contributing to enhancing the social capital in the region by facilitating generational change. It offers a meeting point for different visions on the continuity of forest management.
- ✓ The IA observes a diversification and expansion of the forest-related markets and services offered and rewarded, beyond timber forest products. There is the beginning of a societal consideration and recognition of FES that were previously unvalued and unremunerated.

Economic dimension of sustainability

- ✓ Through dialogue with stakeholders a recognition of FES as having a value also in economic terms is beginning to spread.
- The IM remains in early stages and has yet to establish a pathway from value to long-term funding of the service provision.
- The ambition to have valuation and rewarding of FES included in legislation or in existing fundindg systems appears also still to be an ambition.

Institutional dimension of sustainability

- ✓ The IM adheres to existing policies. As the Basque Country has full competency over forests within its jurisdiction, bureaucracy dealing with the national government is reduced.
- ✓ The PES is based on the condition of additionality, although it is not result-based (practices needs to be improved).
- ✓ The project has a core group made up of different entities that bring together the different visions and sensitivities that may exist in the forestry field.
- ✓ The IA suggests a change to tax laws, to provide an additional source of funding for the PES. This is however currently only a suggestion. The Basque government is responsible for its own tax law, and such a suggestion therefore does not have to be considered by the national government.

Box 2 – Testimony IA Spain/Basque Country, Juan Carlos Uriagereka (IA leader, Chief of Bizkaia Forest Service) and Leire Salaberria (Manager Director at USSE): Combining policy, research, biophysical and social-cultural approaches

Historically, the Basque society has had a very close relationship with forest management. However, in recent years, this relationship has been altered and social groups are concerned about it. This led to the meeting between the Goikolau Cultural Society of Berriatua (with the ambition of working on the natural heritage of their municipality) and

Basoa Fundazioa (with the ambition of developing projects in the forestry field that involve the social management part and that contemplate the ecosystem services they provide). By the time the SINCERE project began, both entities were working to develop initiatives in this regard. SINCERE provided the opportunity to these types of entities to transfer their experience and willingness to the project.

Disaggregating the wide range of services and selecting only a few helped to better focus the subsequent work. Localising the study to a specific, limited and controllable area also helped. For this reason, when during the development of the SINCERE project the study areas (wood, water and lamdscape) were selected and an example site was sought, both entities mentioned above voluntarily proposed the definitive location (Berriatua) and offered the necessary local support.

On the other hand, both the SINCERE project bases and the promoter of the project in the case study of Bizkaia, the Provincial Council of Bizkaia, considered it necessary to consolidate a scientific basis in the development of the entire technical part. The splitting up of the services and the choice of only some of them made it easier to contact the appropriate research entities and agree on collaboration with them. In addition, the possibility of linking their scientific and technical knowledge and assistance to that of the local support group greatly improved efficiency and results.

The close collaboration between the forest owners, the local community thanks to the cultural association of Goikolau, the researchers of the Polytechnic University of Valencia and the University of the Basque Country and the Provincial Council of Bizkaia (regional administration) throughout the project has facilitated its smooth development and implementation. This process has culminated in the publication of a public line of aid for the payment of these ecosystem services.

Spain/Catalonia - Forests and water in Catalonia

This IM is in its end of design phase – beginning of Implementation phase. The IA aims at: i) an IM that is accordance both with the needs of the local actors that will be responsible for its implementation and with the needs of the 'market' that will have to feed it, ii) ecological consistency: the provision of the ES provided by the forestry works must be carefully calculated taken all sustainability aspects into account, iii) inclusion of a wide array of views, to prevent social, institutional or economical failures. The IA assesses the overall sustainability of the IM as positive, especially in the design phase (Figure 9). The chart highlights the main weak point of the IM: the sustainability risk management is not fully covered in the IM and thus the long-term sustainability of the IM, beyond SINCERE, is not ensured. In terms of the IM's strongest points, these refer to the fact that the methodology used to calculate the impacts of forestry on the ES is very robust (taken form the project LIFE CLIMARK), and that the design of the IM has been very participatory and shaped to the needs that arised in every step. Short-term actions to improve sustainability include: i) signing of the agreements with the FO and the Consortium on the functioning of the fund including monitoring and evaluation responsibilities, ii) search for private and public investors, for the first pilot trial transactions, iii) awareness campaign. Mid-term actions include to find a way to secure a minimum amount of yearly money to self-sustain the IM after the SINCERE leadership, and include the contract of a thirde part to do facilitation, monitoring and marketing tasks for the FO Association as a transaction cost. The main long-term action envisaged refers to the revision of the pilot trial.

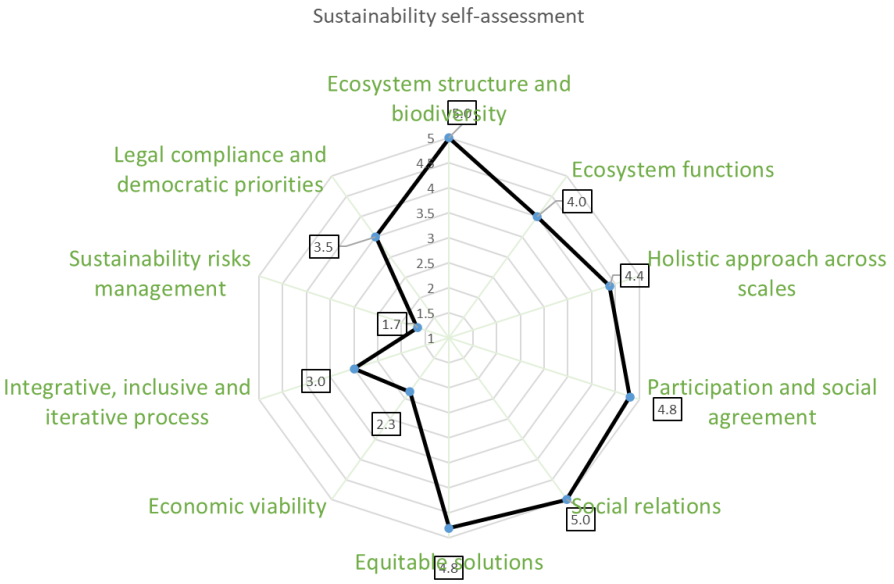

Figure 9 Spiderweb synthesis of the sustainability self-assessment for IA Spain/Catalonia

Ecological dimension of sustainability

- ✓ The aim of the forestry treatments promoted through the IM is to improve the ES most at danger in the Mediterranean: water provision, carbon sequestration, biodiversity.
- ✓ The resistance and resilience of the forest are expected to be improved through fire resistance, soil conservation and increased tree vitality to face droughts (by reducing competition).
- ✓ Even though biomass stock is temporarily reduced, carbon sequestration rate is expected to increase by improving tree vitality.
- ✓ The PROMACC being produced is a landscape scale plan that goes beyond the forest-site scale to achieve a higher impact and counterbalance ES trade-offs.
- ▪ In the carbon balances calculation, the whole value chain is taken into account. A monitoring plan will be in place and the IA is currently defining the certification circuits.
- ▪ Biomass stock is reduced but this is a subproduct of the forest restoration's main objective.
- ▪ Some ethical issues around 'greenwashing' need further consideration. The IA is contemplating whether to accept money from a company that it is using huge amounts of groundwater to compensate its impact via the FUND or from a high CO2 emmitter company.

Social dimension of sustainability

- ✓ The IA is pleased with the participation process carried out in the design of the IM, bringing together diverse actors with different stakes for the first time and reaching a consensus.
- ✓ The IA believes to have achieved a good level of empathy and common understanding among the actors, changed power-relations and mindsets and created a co-responsibility feeling that led to other unexpected collaborations.
- ✓ The IM involves the creation of a FO Association, with specific rules to avoid inequity of access, and to allow small forest owners to participate.
- ▪ Although the IA raised awareness on the new topic water & forests amongst the Catalan water and forest responsibles, broader societal awareness has not yet been achieved.

- Although a certain equity in the participation process has been achieved, the most polarised views were not included in the process. Also, more effort should have been put to involve the conservation NGOs.
- The sustainability of the IM in time once SINCERE finishes is uncertain and remains to be seen.

Economic dimension of sustainability

- ✓ The IM has at is core the aim to improve and diversify the local economy to ensure that forests keep providing a wide set of ES.
- ✓ The IM has adopted the idea of a bundle of ES from the LIFE CLIMARK project where water, carbon and biodiversity are tackled, and quantified, at the same level, the 3 of them being regarded as key ES in the Mediterranean.
- ✓ The IA has created an instrument that could possibly diversify the sources of income for forest management and attract private money to the forests and the ES they provide.
- There is no real economic impact so far, but the first money transactions to the area are not foreseen before the end of 2021.
- The cost-efficiency of the IM remains to be seen. The whole economic sustainability of the project cannot be attained if the IM fails to engage the 'buyers' and a back-up solution like 'seed-money' could be an option.

Institutional dimension of sustainability

- ✓ The IA has identified through the 1st MAG meeting the need for participatory joint water-and-forest planning and has subsequently implemented a joint legal strategic plan ("Urbanistic Masterplan of the water reservoir").
- ✓ The IM complies with all existing laws.
- ✓ The IM has managed to engage the key institutional actors all along the project lifespan.
- ✓ A voluntary PES scheme has been put in place, going beyond business as usual, engaging different institutions in a long-term discussion and participatory process.
- Sofar no learning mechanism has been put in place and, although inclusiveness has been achieved in the design phase, no mechanism has been foreseen to ensure it in the implementation phase.

Finland – Paying for landscape ecosystem services

This IM is in mature phase of implementation. The scale of the produced landscape services is still minimal but the IA has raised the eagerness of the stakeholders in MAG to continue. The core sustainability goals of the IA refer to i) the visual forest landscape, economic sustainability for tourism, ii) biodiversity, additional ES benefit, corporate responsibility, and iii) carbon storage of the growing stock, additional ES benefit, corporate responsibility. The sustainability goals of ecosystem structure, biodiversity and functions are reached in the pilot forest. Sustainability in terms of adoption of a holistic approach in the pilot's ES planning and financing process has also been evaluated positively. The overall sustainability is assessed to have been 'moderately reached' with the different sustainability dimensions performing unevenly (Figure 10). The IM's strongest points are: i) the value and care for the visual quality of forest landscape, and ii) the efforts made to raise awareness of ecosystem services' bundles and values, the holistic approach to stakeholders' interaction and cost-efficiency of the model. The weakest points are i) the relative low willingness of local stakeholders and organizations to commit to the targets of the project ii) need to introduce payments from free public goods landscape and biodiversity to customers and, iii) limited ability to handle larger bundles of ES and values in a more holistic process in this type of project. The attitudinal change has taken time and therefore, the project outcomes should account for innovations and new initiatives also during the process rather than only in the implementation. Short-term actions to improve sustainability include: i) the adoption of a more holistic approach to bundle ES (e.g., including also carbon sequestration and storage services and water ecosystems) for more acceptable procedures by all partners, ii) improve and increase activities to awareness raising and communication and iii) enhancing participation also through the provision of a scientific philosophical basis for dialogues on nature and environment-related intrinsic values. Medium to long-term actions concern the use of big data and artificial intelligence, and nurturing a culture of innovation.

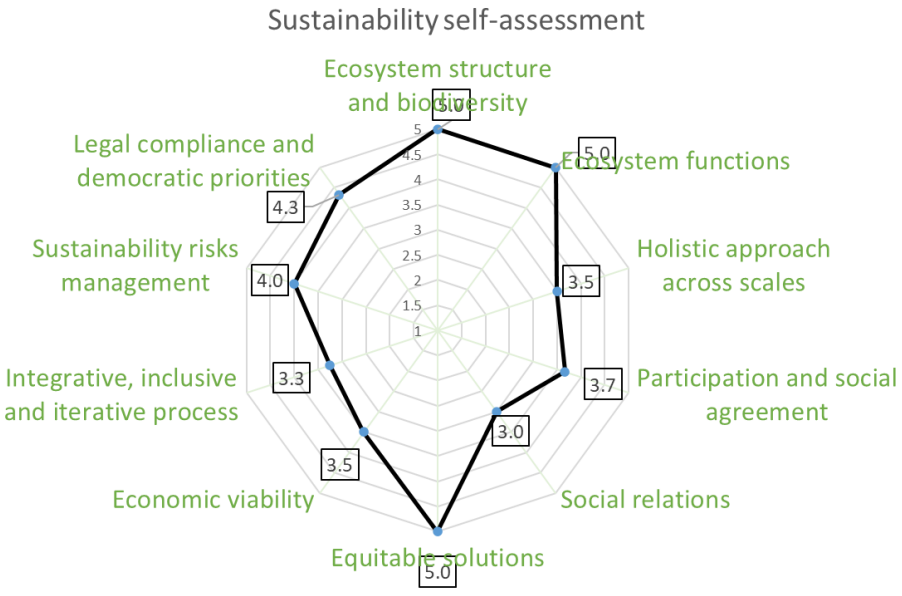

Figure 10 Spiderweb synthesis of the sustainability self-assessment for IA Finland

Ecological dimension of sustainability

- ✓ The IM restores the forest cover and visual quality of the forested landscape and maintains standing stock and natural processes of the forest ecosystem in the pilot area.

- ✓ The valuable areas were identified using available place-specific forest data identified (biodiversity hotspots, landscape values, carbon stocks) and stakeholder's input during the IM's planning process and as the IM targets are not currently protected, additionality is thus guaranteed.
- ✓ The IM maintains the structure of the forest ecosystem, including forest cover and decaying wood.
- ✓ Ecological indicators and thresholds, including species and biotopes, are included in the Zonation, a tool to analyse the local spatial data of biodiversity.
- ✓ The MAG process proved to be very good for handling ecological issues and related values locally.
- ▪ Practical ecological impact in the forest, in the pilot area, was positive but remained limited in scale so far.
- ▪ The IM can be improved by a more holistic approach in the planning process by finding synergies with other forest ecosystem services.

Social dimension of sustainability

- ✓ The IM has put special emphasis on clear, common language and open communication, which was recognized positively by stakeholders.
- ✓ The IM enhanced social capital in the region by providing space and time for discussions over contested issues, enabling exchanges of ideas and building trust within the community.
- ✓ The IM is sensitive to issues of equity and included all the private forest owners, big and small, in its processes. The process also raised similar issues among tourism entrepreneurs that are different size and their capacity to contribute to funding also varies.
- ✓ The IM invested in awareness-raising, which is part of its social sustainability goals. Beyond the MAGs, a social media campaign was launched and raise awareness by 1,5 million people about the IM and ES (counting over 470 000 reaches and eventually 6080 clicks to the page providing further information).
- ✓ The IM aimed at contributing to local coordination, optimization and economic efficiency of producing ES and public/private balance and benefits of those services.
- ▪ Members of the MAG expressed also nature and environment-related intrinsic values. These values are only partially reflected in people's willingness to pay for forest landscape and biodiversity services.

Economic dimension of sustainability

- ✓ One of largest challenged in this IAM was to introduce voluntary payments to tourists and tourism tourism entrepreneurs to new marketed services (landcape and biodiversity services).
- ✓ Financing for 3 ha of forest landscape management actions was secured through donations.
- ✓ It seems awareness of ecosystem services and the need to secure them has increased in the process.
- ▪ The reliance on donations for public goods and remains a challenge for sustainable financing in the future.
- ▪ The scale of commitment has so far been limited.

Institutional dimension of sustainability

- ✓ A platform was established through MAG meetings where different stakeholders could freely communicate, which has been successful in overcoming differences.

- ✓ The IM demonstrates added-value beyond business-as-usual as the whole landscape is valued for its different ecosystem services and the benefits it provides for ecotourism in a holistic approach and the areas targeted were not previously protected.
- ✓ The IM complies with all laws and customary and traditional rights.
- Laws pertaining to financing was particularly challenging (tax laws regarding the payment of VAT and limitations to donations) and laws prohibiting public institutions to receive payments.
- Satisfactory support was not provided by government agencies.

Box 3 – Testimony IA Finland, Juhani Pyykkönen (IA leader, SMK), Liisa Tyrväinen (research partner, LUKE), Henna Konu (LUKE), Risto Mulari (SMK): Institutional challenges - Laws pertaining to financing were particularly challenging

We had troubles to find an organization that was willing to govern the funds. Originally, Ruka-Kuusamo Tourist Association was contacted to collect and govern the funds as they represent tourism entrepreneurs (and tourism sector) in the area. But as this is a new idea, there may have been some misunderstanding about the compensation of their work and tasks and they did not feel good to take over this extra work. Additionally, other non-profit organizations and local associations were contacted and their interest to manage the activity was mapped. Unfortunately, there was no clear interest for this kind of additional work mainly due to lack of resources. This was followed by the idea that The Finnish Forestry Center (SMK) would 'subcontract' the collection of funds through Ruka-Kuusamo Tourist Association, so the Natural Resources Institute Finland (LUKE) suggested to SMK to check if they might be able to govern the funds during the piloting. The Minister of Agriculture and Forestry responded to SMK's inquiry that, even in this pilot project, SMK could not act to govern the funds as it cannot engage in marketing and local business. That is when this challenge started to be really problematic and created some delay in our IA. The solution we found in this IA is that LUKE subcontracted the Ruka-Kuusamo Tourist Association to develop a marketing campaign for the pilot project implementation as well as to manage the fund collection process with the support of project partners LUKE and SMK.

Another key obstacle was that we have a very strict legislation: according to the Money Collection Act, in Finland, only non-profit organizations are allowed to collect funding for a non-profit activity. As said earlier, we did not have any non-profit association willing to take this role. Moreover, the Ruka-Kuusamo tourist association would need to pay value added tax from the donations in case they would receive a long-term permission for collecting funds from the police department. However, the Money Collection Act was updated in March 2020, which allowed different kinds of organizations to collect money for non-profit activities, but only up to €10,000 during three months, and only two times per year. Thanks to this new opportunity, the marketing campaign was launched in September 2020. It was designed around a folklore figure ('elf of the forest') to which donations were to be made. The Ruka-Kuusamo tourist association run two media campaigns, mainly in the social media, but LUKE and SMK supported with a national press release, local radio and newspapers interviews and some other activities. The campaign was also acknowledged in national television and presented in prime-time news. Due to previously mentioned challenges the awareness raising campaign was initiated probably too late in order to create enough attention to the fund collection phase in the area. The collection of funds was made possible but required a complex set up. Ideally, a local solution including active collaborators both from forestry and tourism agencies should be found in the future for similar projects.

Croatia – One-time concession permits

This IM is in the mature phase of implementation. Because of the COVID-19 pandemic, there are fewer organized events than usual but the IA predicts that the IM will be sustainable in the long term. The IA aims at i) uniting the existing knowledge about biodiversity and visitors' impact on nature, ii) raising awareness about benefits that the park provides to health and wellbeing, iii) developing a PES methodology, and iv) expressing the monetary value of the health benefits provided by the Medvednica nature park. The overall sustainability reached is assessed as positive with different sustainability dimensions performing generally evenly (Figure 11). The results of the SSA mostly matched the expectations of the IA, but it is highlighted that the further use of the IM will be mostly conditioned by the results of its pilot study (i.e., assessing the energy capacity of hiking trails). The IA considers the IM's strongest point its contribution in raising awareness about FES and Medvednica being a protected area (rather than a city park). The weakest point connects to unexpected threats of COVID-19: there are a lot more visitors than usual in the park, whose behaviour cannot be controlled since they gather in absence of monitored events. Actions to improve sustainability include: i) repurpose Donation Boxes (a previous 'IM candidate') to an information tool for raising awareness on the ES (short-term action), ii) disseminate the results of the pilot study for users to know which area in the park to use for their activity to achieve the best performance, according also to the concession permit (medium-term action), and iii) actions to make the IM recognizable to users, e.g., Facebook, web, info-centres.

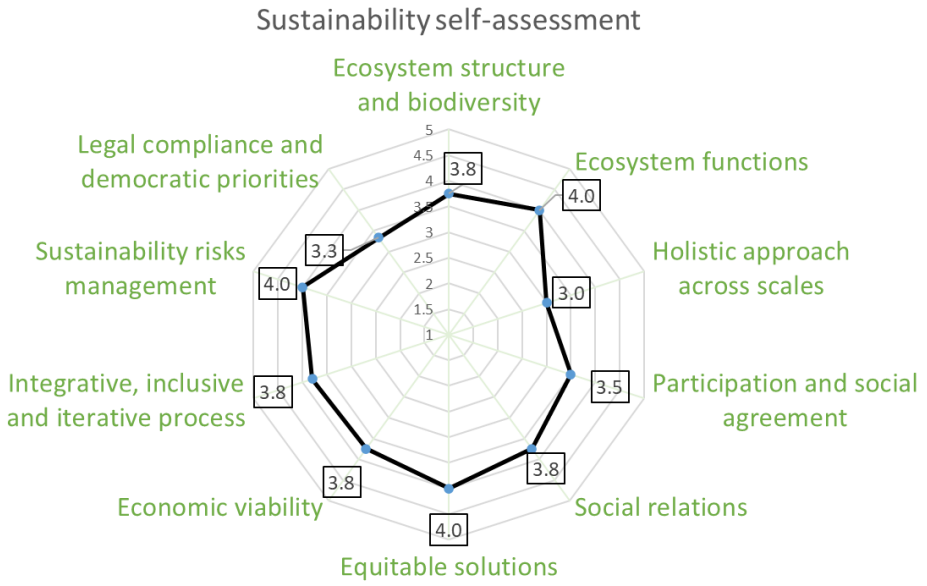

Figure 11 Spiderweb synthesis of the sustainability self-assessment for IA Croatia

Ecological dimension of sustainability

- ✓ The IM gives a set of rules or conditions for visitors or stakeholders in order to minimize the overall ecological impact to the park.
- ✓ By tracking the number of visitors, number of issued concession approvals, number of non-compliance records and number of types of disturbances caused by visitors/stakeholders, the IM will enhance and preserve biodiversity and ecosystem structure.

- ✓ The IM monitors the damages to the soil and flora and fauna. The Public Institution Nature Park Medvednica (PINPM) can prescribe conditions where a certain activity can be carried out in order to reduce the impact on certain critical areas.
- ✓ The PINPM encourages everything "green": infrastructure, events that promote nature protection, etc.
- ▪ The Park has many entrances so one of the challenges is how to ensure that all the events are reported and approved by the PINPM through one-time concession permits.
- ▪ The IA identifies as a challenge to come up with other ways to increase the level of FES awareness among users and other stakeholders.

Social dimension of sustainability

- ✓ The IM influences the perception of the park's visitors, raises awareness on the importance of preserving the protected area and on the benefits that this area has for their health and well-being.
- ✓ The IM is broadly accepted by all the stakeholders that are involved in the IA and is legally justified.
- ✓ The PINPM encourages both big and small stakeholders to participate in management in order to have more satisfied customers/visitors and thus more satisfied service providers (stakeholders).
- ✓ The IM promotes equitable solutions. All infrastructure is public and free of charge. The IM can be used by all (big or small) owners on their property and they can all benefit from it.
- ▪ The IA includes a great number of forest owners in a relatively small area. These stakeholders are often not interested in managing their property, which the IA leader perceives as a challenge but also as a certain opportunity since these stakeholders do not care about the IA and thus, they do not interfere.

Economic dimension of sustainability

- ✓ The fees for the concessions will contribute significantly to the maintenance of infrastructure in the future, to the benefit of surrounding municipalities.
- ✓ The one-time concession permit systems also allow for managing user groups and reduce conflicts among them as well as pressures to the natural areas.
- ▪ The COVID-19 had the two opposite effects of increasing visitor numbers, but reducing and banning the organised activities targeted by the IM increasing de facto pressures, reducing the IM's options to manage this and raise funding for infrastructure.
- ▪ The IA identifies correctly that some level of monitoring is necessary to coerce all organised activities to ask for one-time concession permits. Without monitoring, some will undertake organized activities without asking or paying. Rangers patrolling the park can ensure the use of permits and sanction groups who have activities without a permit, but the number of rangers is too small to cover the park efficiently.

Institutional dimension of sustainability

- ✓ The IM complies with all laws. A new national law requires and regulates permits for protected areas, making them mandatory. This could support the IM, as some visitors still do not see the need to pay for FES.
- ✓ The IM demonstrates added value through its awareness-raising and education activities.
- ▪ Although the nature park is managed by the state there are also three counties (local level divisions) involved thus increasing the number of different administrative bodies creating jurisdictional challenges.

- Awareness-raising to change mindsets is still a challenge, as visitors do not perceive the nature park as a protected area but as a city park (thus do not see the need to pay concession). This is being addressed through social media and local radio campaigns.

Box 4 – Testimony IA Croatia, Ivona Durickovic, Martina Jurjević Varga, Martina Belovic Kelemen (IA leaders, PINPM): Raising users' awareness and relationship with FES

PINPM manages the Medvednica Nature Park but not the forests. Our functions are related to nature protection, visitor management and land use control. In this context, our IA focuses on visitors and users, and in conjunction with them, the health and recreational function of FES. Our IA will try to evaluate only a social component of FES (health-recreation) and, above all, to launch a continuous effort to raise public awareness of FES.

We believe that Medvednica forests have ten times more social value than wood production and forest products supply, because almost ¼ of Croatian population lives in this area. What we are studying in this IA is a part of the biological potential of the forest, i.e., the recreational - health value of the Medvednica forest. Although in Croatia we have a fee for FES, which is 0.0256% of the total income of legal entities per year. In the Republic of Croatia, there is no unified methodology for determining the biological value of a particular forest, but through a field inspection, it is possible to determine the presence of elements: and the description of biological elements, availability, etc. We will try to express this for the health function. The financial resources collected through the FES fee will be used for rehabilitation of destroyed forests, reforestation, protection against fire and pests, demining, scientific research on problems in the forest, etc.

For forests to provide all services and functions, they must be in optimal condition. Our goal is to reduce the pressure of visitors, raise their awareness and thus improve the condition of the forests of Medvednica. Our two mechanisms (donation boxes and one-time concession permits) are an attempt to introduce, in a way, an environmental tax among organized users to finance the content and renovation of the publicly accessible visitor infrastructure, so that their stay in nature becomes as positive as possible for their well-being and thus directly for their health. Through these mechanisms, the aim is to educate users and ensure that their exposure to the constraints imposed by concession permits is reduced.

Donation boxes have not proven to be a good mechanism in our setting, but are used for information purposes (as info pillars), and one-time concession permits are a good and transparent mechanism that can further influence users' awareness and relationship with FES.

Denmark – Reverse auction for forest biodiversity protection

This IM is in the mature phase of implementation as it is entering the contracting phase and then ex-post evaluation. In terms of sustainability targets, the IA aims at: i) quality ES enhancing bids from owners, that is: to hit the target aimed for, ii) cost-effectiveness in the sense that requested prices are competitive, and iii) high acceptance among owners and NGOs, high enrolment and low transactions costs – leading to competition on cost and many high-quality ES options. The results of the assessment match the main sustainability targets of the IA and the overall sustainability reached is assessed as positive (Figure 12). According to the IA, the limited spatial scale of the individual actions resulted in a lower score for certain ecological and equitability aspects. The IA considers the strongest point in terms of sustainability to be the (expected) improvement of biodiversity and, having this goal, the IM achieved a high number of bids submitted relative to budget, which meant a high quality in suggested actions as well as high competition on costs. The weakest point is that the IM takes more preparation and competence on the auctioneering side than e.g., flat-rate subsidies delivered on a simple eligibility rule, which can be an obstacle for the upscaling of the IM. Actions to improve sustainability include: i) conclude all contracts in the current experiment, contingent on EU accepting the cost claims., ii) assess outcomes and compare the performance with existing instruments, and iii) discuss with the relevant ministries and agencies how lessons learnt can be integrated into the design of other measures leading to both upscaling in domain (climate, other biodiversity measures etc.) and spatial context.

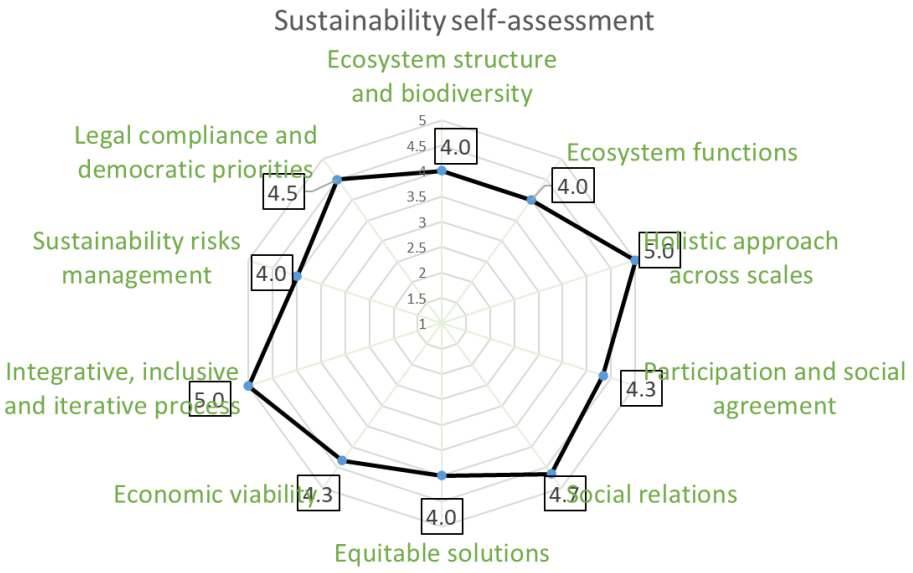

Figure 12 Spiderweb synthesis of the sustainability self-assessment for IA Denmark

Ecological dimension of sustainability

- ✓ The IM, according to the bids received, focuses on biodiversity by re-establishing or ensuring the long-term vitality of forest ecosystems of value to biodiversity and through other relevant measures like improved protection of forest wetlands and forest meadows, protecting other types of biodiversity.
- ✓ The IM performs well when it comes to maintaining or restoring forest cover and standing stock of biomass, and maintaining and protecting biodiversity.
- ✓ The scale of the IM and the kind of forest habitats targeted implies that there are no or negligible downstream effects in the value chains.

- Effects on carbon storage are thought to be neutral in the long run, effects on water ecosystem services are likely positive. There are likely small or positive effects on the recreational value of the forests.
- Ecological trade-offs are likely to arise in the long-term while focusing on maintaining the natural functions of the ecosystem that can support biodiversity. These could be addressed either by minimum restrictions or by designing additional IMs to target them but not necessarily in the same area.
- Because the IM targets small forest habitats, it is unlikely to affect forest vitality at landscape levels.
- There was huge variation in the cost-effectiveness of the ideas proposed by forest owners. The requested price varied substantially across bids and was not correlated to ecological performance. This implies that extra care is needed in the design of the IM when allowing forest owners to co-create the measures undertaken.

Social dimension of sustainability

- ✓ The IM has produced a positive and broad discussion about the potential of this type of instruments with all the different stakeholders involved, and constructive dialogue with the relevant authorities that could upscale this sort of actions.
- ✓ The implementation revealed a rather nice enrolment three times larger than available funds.
- ✓ The IM achieved broad and engaged stakeholder and expert involvement in the process of development. All parties subscribed to the IM goals and also the novelties of the design.
- ✓ The IM benefited from a tradition in Danish governance systems of cooperative governance involving stakeholders or their representatives in processes of relevance to them.
- ✓ No restrictions were placed on participation, except for the willingness to provide the requested information. The IM supported especially the participation of smaller forest owners by targeting them through their extension officers.
- ✓ The IM has no negative effects on access to ES, which regulate entirely outside the IM.
- The small scale of each action and the fact that it takes place on private forest land, sometimes away from paths and roads providing access, limited the relevance and possibility of assessing community involvement and broader social impacts in the IM implementation.

Economic dimension of sustainability

- ✓ This IM used a project budget to implement a reverse auction, which will reach completion during the project. The overall economic impacts are assessed to be i) a source of income for forest owners delivering efforts to enhance ES on private forest land, and ii) a gain for society in achieving enhanced ES provision with measures that are more cost-effective than existing alternatives.
- ✓ As an additional positive aspect, the design allowing forest owners themselves to describe and suggest initiatives (with access guidelines from biologists) showed that forest owners did have many different and inventive ideas on how they can improve the quality of habitats, nature and the protection of biodiversity. It also built ownership to the effort. This aspect likely improves the overall quality of outcomes.
- ✓ The rather nice ratio of bids to budget, which was a factor of three was promising for the upscaling, in particular as the IM was announced for a short period in a limited area and with clear mention of the limited funds.
- The design allowing for variation in offers' type (no standardised action) implies potential gains in cost-effectiveness, but also requires a rigorous selection procedure as implemented, allowing for rigorous handling of the assessment parameters, which is an important lesson for upscaling.

Institutional dimension of sustainability

- ✓ A system of cooperative governance allows all stakeholders to be involved.
- ✓ Existing governance and legal structures were used to secure the permanence of actions, where possible.
- ▪ The overall weakest point relates to an institutional aspect. The fact that the IM takes a bit more preparation and competence on the auctioneering side than e.g., flat rate subsidies delivered on a simple eligibility rule is a challenge. This can be an obstacle for the upscaling of the IM, as it requires that relevant organisations are competent and willing to build capacity to run such IMs.

Italy/Borgo – Selling mushroom permits online

This IM is in the developed phase of implementation. In terms of sustainability targets, the IA aims at i) maintaining the wild mushrooms productivity in forest, ii) maintaining the economic resilience of the local dwellers, and iii) keeping the present forest resilience. The overall sustainability reached by the IA is assessed as very positive and the results of the assessment match the main sustainability targets and expectations of the IA at this stage (Figure 13). Considering that the IM aimed at supporting wild mushroom

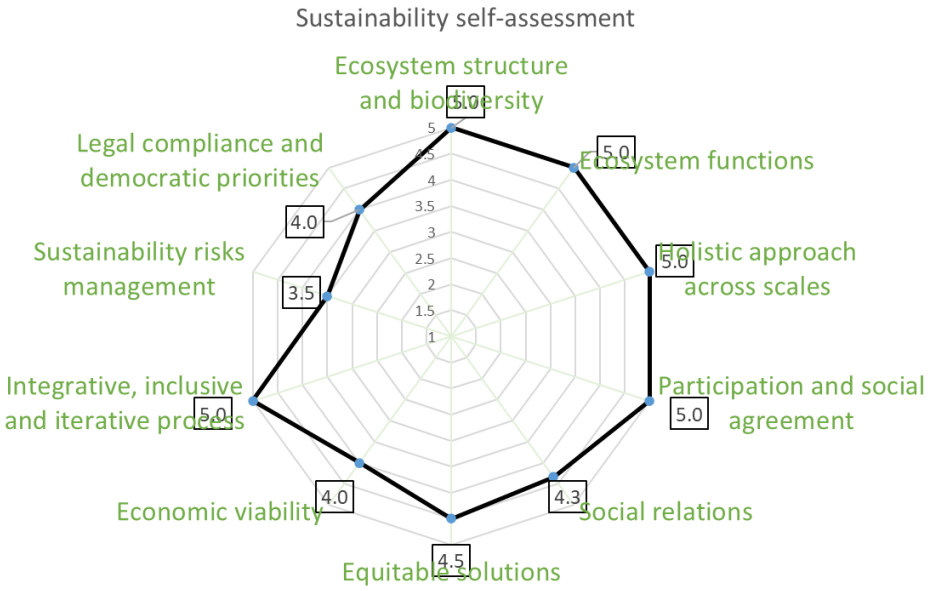

Figure 13 Spiderweb synthesis of the sustainability self-assessment for IA Italy/Borgo

picking as recreational activity in the forest, the IA considers the strongest point in terms of sustainability to be the raise in demand by mushroom pickers due to a higher chance to pick wild mushrooms in the specific forest in comparison to other areas. The weakest point refers to the growth in coordination costs. Actions to improve sustainability include: i) provide an online platform to sell picking permits and other touristic offers to further increase the number of recreational wild mushroom pickers (short-term action), ii) maintain the present silvicultural approach and interlink the forest recreational activities with national tour operators (medium-term actions), and iii) maintain the present silvicultural approach while testing new silvicultural techniques.

Ecological dimension of sustainability

- ✓ The IM preserve and/or enhances the ecosystem structure, including stand structure and biodiversity. Specific forest management is applied, with cutting methods decided jointly with a representative of the mushroom pickers, a manager of CCP and a professional forester of the area.
- ✓ The IM preserves and/or improve the ecosystem functions. Guiding the mushroom pickers to areas that are already productive in mushrooms contribute to maintain and enhance the productivity of these areas as well.
- ✓ The IM favours landscape approaches with a harmonious integration of different land uses focusing on fair land use share between forest and agricultural lands: the proportion of forest surface remains stable.
- ✓ The IM had identified and avoids any potential negative environmental impact.

Social dimension of sustainability

- ✓ The IM is broadly accepted, ensures participation and equitable solutions.
- ✓ Equity in access to the IM is guaranteed.
- ✓ There is a balanced distribution of (economic) benefits/income and costs between public and private (reinvestment in forest management for mushroom production). On the forest land owned by municipalities, the distribution of benefits from the permit commercialization is done according to written rules. In the comunalie (community forests), the allocation of the benefits is negotiated each year, it is either reinvested in the forest management or is invested in community projects such as the renovation of infrastructure.
- The number of paper ticket resellers remains high and is not the most efficient to reach younger customers.
- The access to the ES, i.e., the probability to have or not a good harvest, is conditional to the ticket the user purchases (diverse price categories allowing harvest in more or less productive areas of the forest) and other factors such as the number of other users.

Economic dimension

- ✓ The IM addressed a technological enhancement for permit management in an already more than the 50-year-old market for mushroom permits; thus, a marketed good, and the experience was an increase in demand for permits and hence increase in gross revenues. Gross revenues accrued to the Comunalie may have a broad equity effect as funds used for public purpose.
- The market is well developed with a significant annual turnover.
- The IA partner mentions increased coordination costs as a drawback of the IM, but it is not quite clear who carry these costs (permit buyers, permit sellers or mediating agents?).
- The IA also mentions costs related to organizing the people to determine the cutting methods in the mushroom designated forest parcels.
- The FES in focus here is already a marketed provision good or service; as such the additional innovation cannot be easily extrapolated to the enhanced payment for FES that are not already marketed.

Institutional dimension of sustainability

- ✓ A well-established governance platform exists where the different stakeholders and communities within the consortium can meet and discuss risks and tensions.
- The IM deals with historic power struggles as the regional government and the local government (Communalie) have different interests.
- The IM adheres to existing laws, although it perceives certain laws and regulations as hindering factors (laws limiting the picking allowance although it is in contradiction with the latest research).

Box 6 – Testimony IA Italy/Borgo, Enrico Vidale (IA leader, UNIDP, External consultant): We see what we know, and what we know is very limited

Everyone sees what he or she knows, so foresters may see the forests as source of wood, while the hunter intend it as refugee of animal, or the environmentalist as generator of biodiversity. In other terms each of the stakeholders that move a step inside the forest appreciate more what they deeply know. It is easy to understand way the forest manager in the Taro Valley thought to design and implement a new model to manage wild mushroom production and trade almost 60 years ago in Borgo Val di Taro. At that time, local forest managers tried to create new economic opportunities for forest owners and local dwellers, and they though wild mushroom production in forest was a good opportunity. Hence in 1964 they decided to implement a payment mechanism to support the wild mushroom production in forest, even if a "true" silvicultural model was introduced only in the late '90s.

The problems of the past are not different from the actual ones. Today, any kind of income source in the forest sector is much welcome. We can call it carbon sequestration, biodiversity offset, recreation in forest or whatever it will come in the mind of researches of politicians. However, it must communicate in the proper way to the forest managers, because they rarely apply what they do not know. The app we developed is an example, and it took almost 3 years to became a reality. Local forest owners did not perceive the need on the way they sell the permits, but the large presence of younger mushroom pickers finally convinced them to adopt this new technology. It was a long way down, in which Sincere Project was determinant.

Now we need a new phase, where we should start to train the next generation to see with different eyes the forest and its products. Whenever a tree is cut in the Taro Valley, there are several users that do not understand why we cut that tree. There is an urgent need to educate once again the eyes of our forest users, because they loss the connection with rural areas. Many recreational pickers come from urban area, and they use the time in the forest to relax. It is a paradox, but they like more forests that has low biodiversity (technically speaking even aged stand forest) and they would like to have all the forest like that. After a local campaign of information organized by the natural guide association of the Taro Valley, we have seen that people started to understand the role of silviculture and its links to the high number of deers and wild mushrooms, decreasing the complains forwarded to the CCP. The lessons learnt are many, but we can say that education plays a fundamental role for the market of ecosystem services, and today as in the past it is matter of "how well educated are our eyes".

Italy/Etifor – Compensating nature conservation measures

This IM is in the mature phase of implementation, currently being replicated. Following intermediation by Etifor, poplar farms and the Park Authority signed a 5-year agreement in which the farms committed to carrying out specific conservation interventions in natural areas owned by the Regional Park to fulfil the Forest Stewardship Council (FSC) requirement. The IA aims at economic viability, maintaining and enhancing biodiversity, and respecting the FSC standards. The overall sustainability reached by the IA is assessed as positive (Figure 14). Although the four dimensions perform unevenly, the results of the assessment seem to match the main sustainability targets of the IA at this stage. The main unfulfilled goal refers to the fact that the cost of FSC certification for small landowners is not sustainable in all cases without other external funds. This relates to what the IA perceives to be the weakest point of the IM: the economic

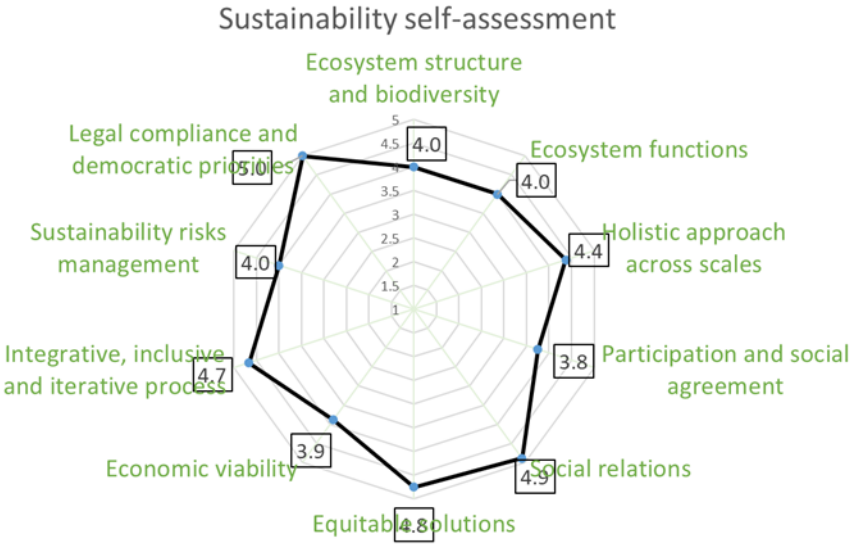

Figure 14 Spiderweb synthesis of the sustainability self-assessment for IA Italy/Etifor

sustainability of the FSC certification for poplar farmers. The IM's strongest points, on the other hand, are the positive environmental impact and the significant income generated for the park. Short-term actions to improve sustainability have already been implemented and include: i) change the way derogations are made in FSC standard, to adapt it to the poplar situation, ii) reducing the FSC certification group fees, iii) developing derogations that allow the use of certain chemicals, and iv) a policy-brief guideline on what can be done in FSC poplar groves. Medium-term actions include: i) research biological solutions to pest treatment/containment, ii) identify and speed up the registration of a substance that is suitable for fighting the Asian bug, iii) test new sales methods by strengthening the role of poplar growers, iv) supply contracts of several years, where the poplar grower (or a network/consortium of FSC-certified poplar growers) undertakes to deliver a minimum quantity of timber against the payment of a pre-established price by the user, v) cultivation (or sharing) contracts in which the user directly bears part of the investment costs and therefore also the business risks, vi) development of new contractual forms, replicating the French model, vii) sales supported by online geo-referenced information on the lots offered for sale. In the long-term, the IA aspires to find resources at the EU level to undertake an experimental project aimed at finding solutions for the cultivation of quality poplar following FSC principles and/or technical/scientific dissemination to adopt more compatible means.

Ecological dimension of sustainability

- ✓ The IM allows increasing forest cover by restoring areas within the park and ensure more sustainable forest management in established poplar plantations, which leads to the maintenance of the biodiversity and the provision of FES in the area.
- ✓ The IM increased the forested area, enhanced the landscape, and improved forest management without negative impacts on the natural capital.
- ✓ The IM preserves forest vitality, and FSC certification for Ecosystem Services implies the enhancement of the forest functions.
- ✓ The IM does not create products that have a negative impact on carbon storage.
- ✓ The IM is accompanied by instruments (management plans, monitoring, etc.) able to detect possible negative environmental impacts.

Social dimension of sustainability

- ✓ The IM has been inclusive in involving the participants and in the signing of the agreement and guaranteed equity among the actors directly involved.
- ✓ The IM included consultation processes and instruments that allow conflict resolution; the signed agreement makes explicit the sharing of common values and responsibilities.
- ✓ The relations among the different stakeholders are transparent and fair; there are no barriers to access the IM in terms of hectares or other restrictions.
- The involvement of a higher number of actors and hectares can be improved as they are still a minority out of the total. The IA tried to enlarge the participation to the IM to other forest owners but the economic issues made the involvement of small poplar farms more difficult.

Economic dimension of sustainability

- ✓ The IM has been successful in the sense that agreements have been made between individual poplar growers and the park to fund nature conservation activities in the park.
- ✓ The IA partner notes that for the medium-to-larger poplar growers the scheme is a cost-effective way of achieving the FSC certification requirement on setting aside land for nature and biodiversity; which is correct.
- The IA partner also notes that for smaller poplar growers, the gains in cost-effectiveness are not enough to overcome the other transactions costs associated with FSC certification.
- By construction, this IM may be susceptible to questions regarding additionality as the measures paid for appears to be part of a natural park already designated as such. It may be relevant to ask if this funding crowds out other funding, e.g., public funding of sorts, though interviews suggest there is limited funding to crowd out.
- The IA partner identifies up-chain issues as the poplar wood, while FSC certified is sold as such to a significant degree – this limits the incentives to engage in the FSC-scheme and thereby the Ecopay scheme.
- The element that can be improved is the adoption of the FSC standards along the whole Value Chain (Chain of Custody) to ensure that all the wood that is grown as certified is sold as certified until it reaches the final consumer.
- An improvement that can be further done is to value the certified wood at market level in order to support the forest owners' work and to spread the culture of certification.

Institutional dimension of sustainability

- ✓ The IM adheres to existing laws and regulations, including additional FSC regulations.
- ✓ Within the IM different instruments are present that support conflict management and resolution. A local contact person is always available.
- ▪ The IM is an upscaling of an existing scheme and the development of a feasibility study for three other areas. As such, policies do not represent an important new obstacle to the implementation of IA. The critical point is getting other farmers to join the payment scheme that has proven to work under the given policy setting.

Box 7 – Testimony IA Italy/Etifor, Giulia Amato (IA leader, Etifor Ecosystem Service Consultant), Giorgia Bottaro (research partner, UNIPD): The importance of personal beliefs: a fundamental element to be considered, but unfortunately not the only one

As our IA was in an advanced stage, it was possible for us to focus not only on its design and on its technical aspects, but also on other relevant elements that in other conditions could had been neglected: following the process of our IA we realised the importance that the single person has, and how the personal attitude towards the whole IA has been relevant and fundamental in the success of the scheme.

The IA, indeed, was born from the idea of a single far-sighted person, who has been able to construct a dialogue among the key stakeholders that could support and put in place his vision. Moreover, without the involvement of the single poplar owners, who participated voluntarily bringing their own convictions and viewpoints, the implementation of the IA would have resulted impossible.

Despite the importance of the singles attitudes, we also realised that this is not enough to make the IM sustainable over time. Indeed, when the personal convictions collide with the harsh reality and with the difficulties of market rules, that is unable to recognise the commitment of the stakeholders, the possibility to scale the IM up is reduced. In fact, IM scalability is affected both by the involvement of others poplar ownersand in terms of its persistence over time.

Concluding, on the one side it is possible to state that the presence of single persons that strongly believed in the scheme and put themselves at stake was essential to develop the IA; on the other side we must recognize that a great deal of effort will still be needed to make wishes come true.

Peru – Paying for watershed services to cities

This IM is in the mature implementation phase. In terms of sustainability targets, the IA aims at i) improving water security (quantity and quality) for the city of Cusco, ii) improving water security (quantity and quality) for the local communities, and iii) ensuring the good governance of water and ES. The spiderweb synthesis clearly illustrates the overall sustainability's characteristics: the ecological aspects and the legal compliance are strong, whereas the social aspects and some institutional aspects are weak (Figure 15). The IA considers its strongest point in terms of sustainability to be the fact that the budget is ensured through a fee on water bills and that the IM is a learning site for other PES schemes in the country. The weakest point relates to the lack of dialogue among stakeholders and the limited inclusiveness in decision-making and benefit-sharing; the relationships between the drinking water company and the local communities have sometimes been tumultuous. Actions to improve sustainability include: i) hiring an expert in social and

institutional aspects (short-term action), ii) reinitiating interactions among stakeholders and create a governance platform (medium-term action), and ii) documenting lessons learnt (long-term action).

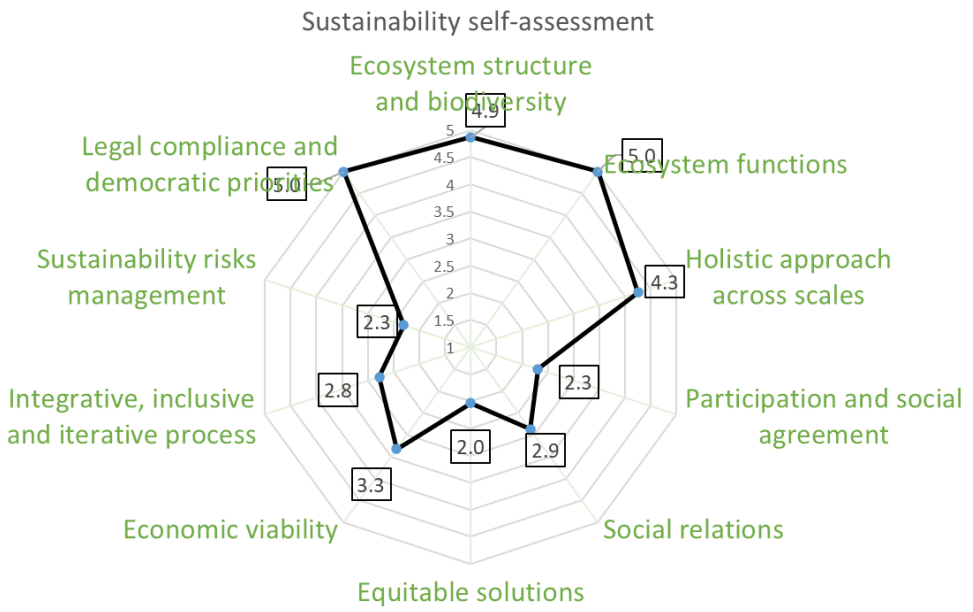

Figure 15 Spiderweb synthesis of the sustainability self-assessment for IA Peru

Ecological dimension of sustainability

- ✓ The IM contributes towards reforestation in the area and uses only native species for tree plantations and grassland restoration to avoid negative impacts on biodiversity.
- ✓ The IM considers geophysical and hydrological risks associated with mudflows, landslides, drought and extreme rainfall.
- ✓ The IM has taken measures to improve ecosystem functions related to hydrological regulation (increasing infiltration, reducing runoff and erosion).
- ✓ The IM recognizes critical thresholds in water quality in the lake and invested on sanitation systems and on the protection of the lake edges.
- The IM provides a good justification of the site selection based on hydrogeological studies but local people question the choice of the site, thus more research is needed.
- The IM considers ecological sustainability in agriculture, e.g., by supporting the reduction of agrochemicals in local agriculture, but implementation is slow.
- Field observations show certain negative ecological impacts (e.g., the IM aims at reducing erosion but has built a road that generated erosion and the mitigation measures have been limited).

Social dimension of sustainability

- The IM did not engage local communities enough in the decision-making process, beyond information.
- There are still diverging objectives among the stakeholders and historical conflicts.
- There is no clear mechanism in place to enable communication among the stakeholders. The functioning of a platform implemented by an NGO, for this reason, is challenging.

- There is recognition of the roles of different actors (e.g., the drinking water company, the local communities or the local authorities) but there is different interpretation in the division of responsibilities.
- The IM does not seem to benefit equally the communities and does not consider equity issues at household or individual levels.
- It is unclear who will benefit from the improved water regulation from the IM. Direct monetary benefits for the local communities include their salaries for fieldwork (planting trees, digging trenches) but this is only a marginal income. IM's proponents expect the development of new sources of incomes for the communities as tourism increase in the area but this is still uncertain.
- There are controversies between stakeholders regarding the necessity to compensate the opportunity costs of communities for the loss of pastures due to restoration measures.

Economic dimension of sustainability

- ✓ The IM has been successful in implementing an additional fee on the water bill as a potentially sustainable source of funding.
- ✓ While there is not yet hard evidence of synergies, the stakeholders seem to agree they will arise; and notably investments have been made to exploit potentials from tourism. This suggests that ownership to actions could grow in the future if the tourism gains materialise.
- While funding is made available, there is a potential to improve on targeting and cost-effectiveness noted by the IA partners.
- Related to the targeting of the IM, the overall distributive effects (of costs and benefits) could also be clarified and likely improved upon. The relation to potential tourism increases and related economic activities (e.g., handicrafts commercialization) is one aspect of distributive effects of actions.

Institutional dimension of sustainability

- ✓ The IM complies with all existing national laws, including a national law aimed at regulating PES.
- ✓ Money received by the drinking water company is allocated to the benefit of the community through the IM, although the payments are not directly made to the community. This increases transparency and reduces the risk of corruption by community elites.
- ✓ IM is a pilot PES case in Peru, tested the national law on PES, and thus serves as a learning mechanism.
- Staff turnover at the drinking water company may weaken the learning process.
- A governance platform where all different stakeholders can communicate is lacking.
- Several power asymmetries exist e.g., between the big drinking water company and the community.

Box 8 – Testimony IA Peru, Bruno Locatelli (IA Leader and Research partner, CIFOR): Experimenting, Learning, and Sharing Lessons

The implementation of a Payment for Ecosystem Services (PES) scheme is not straightforward. The experience of the Peruvian IA has been very valuable to learn about the process, particularly about how decisions are made. For example, in a PES scheme, it is important to recognize that multiple, sometimes conflictive, objectives have to be reconciled and that different types of knowledge should be confronted and combined, for example, the technical knowledge of forest or water engineers and the traditional knowledge of local communities. The decision rules have to allow different perspectives to be exposed and a negotiation process to take place around what future is desired

and how to reach it. Assessing the design, the implementation, and the outcomes of a pilot project, such as the Peruvian IA, and sharing the lessons learned are crucial, as many similar PES schemes are being developed in Peru in similar contexts, with drinking water companies using a fee on water bills to pay for the ecosystem services provided by upstream local communities.

Russia – Providing multiple ecosystems services by forest renters

This IM is in the developed phase of implementation. The Scientific Council on Forest Issues of RAS has developed the concept of a new 'Forest Code', which has been presented to the business and scientific communities and governmental bodies. In terms of sustainability targets, the IA aims at: i) sustainable long-term use of forest ecosystems based on eliminating the trade-offs and facilitating the synergy between various ES provision by forests, ii) legitimate recognition of the non-monetary ES values aimed at creation of markets for said ES, and iii) elimination of conflicts between the forest stakeholders and ensuring the regional economic development. Overall, the IM seems to be designed with a generally high level of sustainability in mind (Figure 16). The various dimensions appear to be performing unevenly but the strongest aspects match the goals and expectations of the IA. Economic viability is hard to assess at the current stage but the IA partners highlight that it is improving. Institutional sustainability is harder to achieve within the framework of the current system of forest management, but this SSA will be used by the IA to improve the IM's overall design. The IM's strongest point in terms of sustainability is its aim to provide a legislative basis for ecological sustainability, balance between the ES and biodiversity preservation, which in turn will increase the well-being of citizens. The weakest point is that the suggested IM cannot guarantee a complete protection of locals' and small businesses' interests. The development of a legislative basis outside the framework of this IM is deemed necessary to achieve this goal. Actions to improve sustainability include: i) conducting surveys among stakeholders and experts about possible solutions for sustainability issues (short-term action), ii) raising awareness and popularisation of the ES concept and multifunctional forest use among the forest stakeholders to ensure their understanding, and development of economic evaluation of non-monetary FES techniques and methods (medium-term actions), and iii) implementation of the forest lands zoning in accordance with the ES (long-term actions).

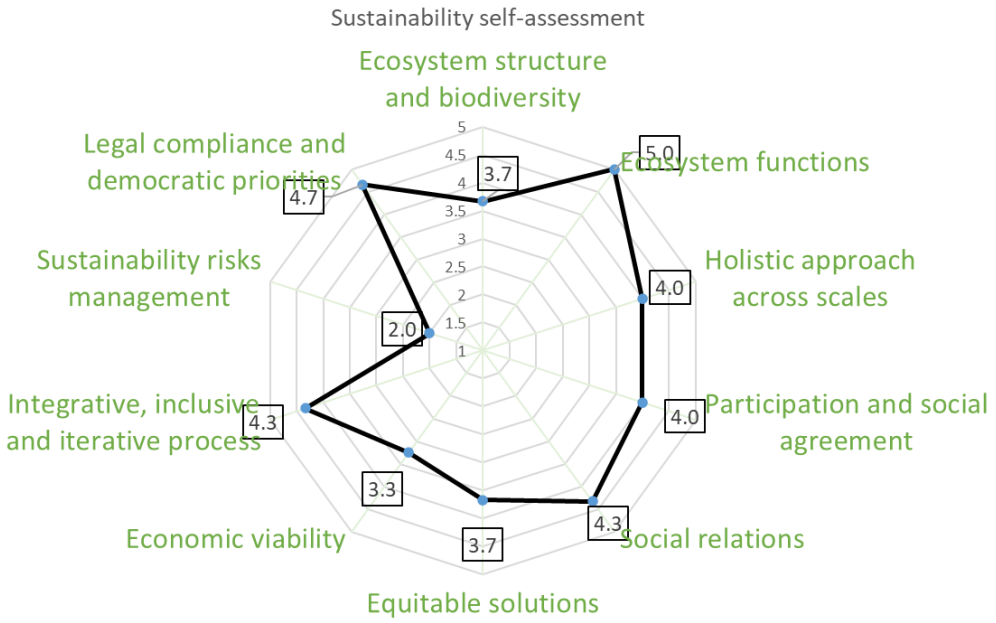

Figure 16 Spiderweb synthesis of the sustainability self-assessment for IA Russia

Ecological dimension of sustainability

- ✓ The IM's performance can't be assessed at the moment, since the draft law hasn't been put into action yet. Nevertheless, the IM's design is generally promising when it comes to preserving and/or enhancing ecosystem functions and adopting a holistic approach across scales.
- The IA partners mention that due to their expertise (i.e., institute mostly focused on studying trees and other flora), the IM has not taken into account the impact on the biodiversity of any organisms except plants. After this SSA, the IA partners will include at least bird species in their next assessments.

Social dimension of sustainability

- ✓ Presenting the IM's Forest Code concept helped to raise awareness about ES and multifunctionality in forest management.
- ✓ The MAG meeting surveys showed that the participants felt free to express their opinion and agreed that the participants' composition was representative.
- ✓ The MAG meeting surveys showed that the proposed IM and the way for its implementation are generally acceptable by the majority of the stakeholders.
- ✓ The IM includes a public tender procedure that allows free access of all the stakeholders to the ES production.
- ✓ The IA partners are currently conducting a survey to examine the level to which stakeholders acknowledge their responsibility for the future of the forests and feel that their role in forest relations is recognized.

Economic dimension of sustainability

- ✓ The idea of improving regulation to avoid single ES uses negatively affecting overall performance or competing unnecessarily is good.

- The revision of the law is only progressing slowly, and it is unclear if it is formally on track or still on the idea or pre-proposal stage.

Institutional dimension of sustainability

- ✓ The IM achieved its goal to produce draft legislation to deal with the provisioning of multiple FES, as an improvement to the current national forest law, as well as data and models to visualise the proposed improvements.
- ✓ The draft legislation, data and models create awareness of multiple FES and serve as a discussion point at the government level.
- ✓ The models could serve as a learning mechanism, however, it is not yet clear if this would be successful in the implementation process, as the implementation of the legislation has not taken place yet.
- The current Russian national forest law does not allow for PES for multiple FES. Although awareness is created by the IM on the potential of PES for multiple FES, the law transformation process is slow.
- Power asymmetries are faced, which slows down the transformation process.
- The IM has the potential to provide added value, but this is not concrete yet as implementation has not taken place yet.

Box 9 – Testimony IA Russia, Daria Tebenkova, Anton Kataev and Natalia Lukina (IA leaders and researchers, Russian Academy of Sciences): Understanding and regulations issues in Russian forest management

First challenge encountered in our case study was to build a common understanding of the FES concept among the different stakeholders. For example, non-academic stakeholders were not aware of the crucial role of forests in mitigating climate change through carbon sequestration in biomass and soil. Thus, each meeting had to be preceded by an introductory part in which topics on ES were presented. The term “service” was deemed inappropriate by some stakeholders, who saw it as derogatory evidence that nature is considered subservient to humans. This issue followed us on all levels, from local stakeholders to government officials. The term “nature capital” was considered more preferable. The only solution we were able to suggest is education and dissemination campaigns focused on conveying the FES concept to the general populace and forest stakeholders in particular.

Educational activities also have a potential to help in dealing with the issue of stakeholders being unfamiliar with balancing the ecosystem services to achieve multipurpose forest use. It seemed like they were concerned about losing some of their “guaranteed” profits from wood biomass, while the new sources of income were looked upon as “unreliable” and “unfamiliar”. However, it’s not just a knowledge problem, since our current forest legislation is primarily focused on wood while lacking severely in terms of regulating the other forest uses. This heavy focus on wood is rooted deeply within the forest policy in Russia, which brings forth the lack of interest in introducing new ES into the market. The state will need to be more proactive to solve the problem of an unbalanced forest use, which can include tax breaks for tenants, preserving biodiversity on their plots, as well as collaboration with existing carbon markets, or development of a regulating framework for forest carbon projects.

By solving all the aforementioned issues, creating a solid legislative framework and spreading the understanding of ecosystem-based approach to forest management, we’ll be able to address some underlying problems of forest management in Russia, for instance making it less centralised, thus giving the tenants more leeway in broadening the spectrum of ecosystem services they want to make use of on their rented plot.

Switzerland – Providing places to bury ashes of beloved people in the forest

This IM is in the mature phase of implementation. In terms of sustainability targets, the IA aims especially at preserving the ecosystem structure, ensuring a holistic approach across scales, and ensuring an economically viable IM. The overall sustainability reached by the IA is assessed as positive (Figure 17) and the results of the assessment seem to match the main sustainability targets of the IA. There is a certain weakness in the 'holistic approach' aspect, which has to do with the fact that the offer is very delicate and cannot be easily upscaled to the broader public. The IA considers the IM's strongest point in terms of sustainability to be synergies that seem to be developed between the different sustainability dimensions and interests, while the weakest point has to do with the IM's 'marketing'. Actions to improve sustainability include: i) analysis of trends and state of interest, and interviews with clients (short-term action) ii) middle-term-strategy for the future development of the offer, and adaptation and further development of the business model (middle-term action), and iii) providing additional offers, upscaling the offer and activities with stakeholders (long-term action).

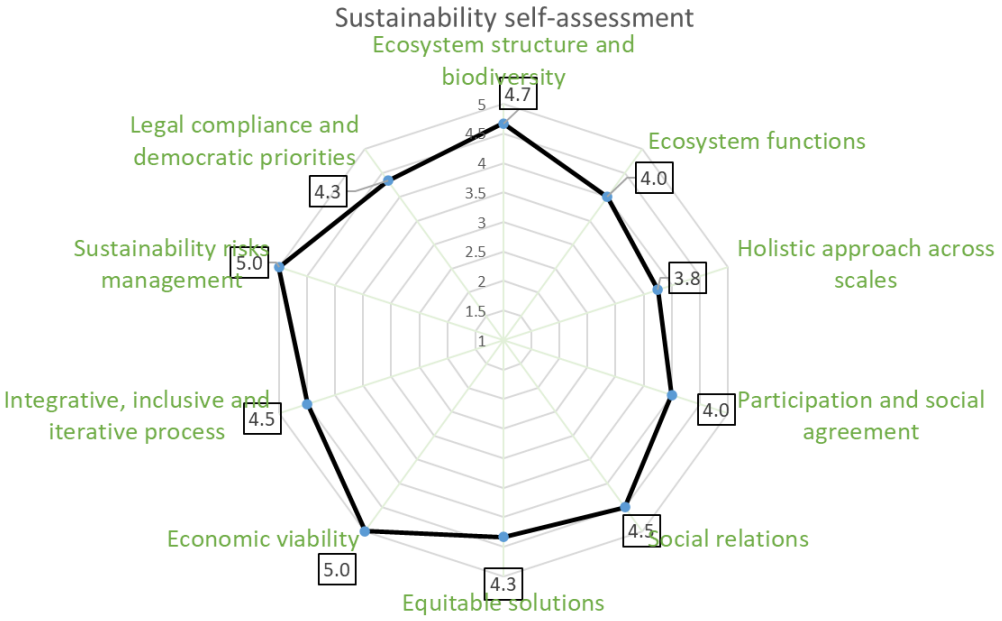

Figure 17 Spiderweb synthesis of the sustainability self-assessment for IA Switzerland

Ecological dimension of sustainability

- ✓ The IM, through the contracts with clients, can preserve individual trees and individual ecosystems for a long time (30 years or more).
- ✓ The influences on the ecosystem functions are very low and no impacts are evident within the scope of the IM.
- ▪ Concerning the already existing uses such as recreation and leisure in this forest, there are no ecological impacts detected but negative effects could arise from additional forest visits. The IA mentions that these negative effects can be managed through appropriate accompanying measures but there are no more details on this within the IM's assessment.

Social dimension of sustainability

- ✓ The IM makes a direct contribution to cultural development and new places are created that allow a connection between the local population and their forest for a long time.
- ✓ The IM creates new contacts and reaches new target groups creating a new type of relationship between the forestry enterprise/forest owner and the customers and thus also new perspectives.
- ✓ The IA explains that due to the skilful embedding of the IM in the overall management of the forest and to very reserved labelling in the forest landscape, there are no trade-offs or direct competition with different uses and interests.
- ▪ The IA mentions that the new customer group and the associated new needs brought up the need for new skills and approaches.

Economic dimension of sustainability

- ✓ The IM has added a new revenue stream to the portfolio of the forest owner involved forest owner, although its size is not stated. It is stated that revenue exceeds costs, which is credible given the simplicity of the service offered.
- ✓ The IM does not imply a trade-off with other activities and ES, provided the management can allow for space around the graves and placement so as to not affect other recreational users.
- ▪ The IA notes 'Marketing' as a challenge, but it is not clear whether this is towards customers (families who face a funeral) or towards the supply side with more areas.
- ▪ There is little in terms of assessing potential further developments, but presumably legal frameworks are in place and a geospatial analysis could reveal potential areas of interest for additional supply.

Institutional dimension of sustainability

- ✓ The IM complies with the applicable laws. In the specific canton in Switzerland, there are no laws prohibiting the deposition of human ashes in the forest. This is however not the case in all other cantons in Switzerland.
- ✓ The IM has established a good relationship with the other stakeholders (local community, church and conventional cemetery) and government agencies through an integrative platform.
- ▪ As the IM is a private and very sensitive offer, no official democratic process could be undertaken for its development.
- ▪ The IM is a relatively new concept and related to a sensitive topic (burial), especially with smaller actors, where the innovation process is not institutionalised as such, new offers can trigger fundamental resistance.
- ▪ A new skills set is needed by the forester, currently not taught in forestry schools. Assistance for obtaining these skills might be helpful.
- ▪ An attempted new valuation assessment system was found to be too complicated, as the values attached to different trees for the purpose of this IM is subjective.

4.5 Two in-depth SSAs: IA Belgium/Flanders and IA Spain/Catalonia

In this section, the self-assessment outcomes are complemented with two in-depth assessments, in order to validate and improve the self-assessment approach. The two cases selected for in-depth assessment, IA Belgium/Flanders and IA Spain/Catalonia, are complex and representative of two main types of IAs developed in SINCERE: first, the implementation of existing PES-like mechanisms and their adaptation to local specificities (2 pilots of inverse biodiversity auctions in Flanders/Belgium); second, a widely participative process creating a new ecosystem services mechanism for a particular region or country (forest management for water payment scheme in Spain/Catalonia).

4.5.1 In-depth look at IA Belgium/Flanders SSA

Within the framework of SINCERE, the innovation action developed in Flanders/Belgium consists of two pilot projects of reverse auctions. The leader of this IA is Natuurinvest, a public organisation that generates and invests funds for nature, in support of the Flemish Agency of Nature and Forest (Agentschap voor Natuur en Bos - ANB). The Flemish public administration is looking for alternatives to flat-rate subsidies to strategically enhance the cost-efficiency of the allocation of public funds in nature governance. This IA aimed to test a new method for allocating subsidies, which did not overlap with any of the current fixed schemes but addressed a gap in the current system. In this section, we present an analysis of the IA based on the data collected in SINCERE (screening, SSA, and MAG reports), on literature, and interviews with IA leaders and stakeholders. First, we present the context of the IA, which corresponds to an ex-ante sustainability assessment covering ecological, social, economic, and institutional dimensions of forest and wildlife governance in Flanders. Second, within this context, the IMs, i.e., the two pilot projects of reverse auctions, were developed through a process in which we distinguish four phases: (i) the establishment of the first features of the IMs, (ii) their full development with the participation of key stakeholders, (iii) and the implementation of a first and (iv) second call for participants in the auctions. Third, the analysis of the IA design and implementation process reveals the potential of the IA in Flanders as well as limitations or pitfalls related to the technical and administrative complexity of the mechanisms tested, the (mis)consideration of variables such as time, communication and cultural values, and institutional and legal obstacles. Finally, we conclude with an overall assessment of the IA and with reflection on the post-SINCERE outlook.

Presentation of the IA's context

Forests in Flanders are scarce, fragmented and under increasing pressure due to the expansion of agriculture and urbanisation (Demolder et al., 2017). During the last years, the government has been struggling to increase forest cover and to secure the provision of FES amidst a low forest index, high levels of fragmentation, lack of ancient woodland, and low diversity, with at least a quarter of woodlands being monotonous coniferous forests (Govaere, 2020). Forest quality and functional diversity are slightly improving through conversions of often coniferous monocultures to mixed woodlands, both spontaneously and actively. However, the Flemish Research Institute for Nature and Forest (INBO) estimates that almost 90% of forest habitat types in Flanders are in an unfavourable conservation status (Demolder et al., 2017). Despite this poor habitat conservation status, several birds or mammal species have made a notable comeback in the region, such as wild boars and, more recently, wolves. After a period of absence since the end of the eighteenth century, the evolution of the number of wild boars shot in Flanders per year from 2006 till 2020 indicates an exponential population increase. Although this is a positive trend in terms of biodiversity, the increase in wild boar populations comes with some negative consequences for the local

habitants and especially farmers through, for example, damages to nature, gardens and especially crops and through foraging or transmitting diseases to livestock (ANB, 2019a; Rutten et al., 2019).

Forest ownership is highly fragmented in Flanders. Around 60% of the total forest area is privately owned, and more than 100.000 forest owners have plots of an average size of one hectare (Serbruyns & Lust, 2003; Van der Aa et al., 2000). The Flemish government, provinces and municipalities own around 40% of forests, and an increasing share of forests are owned by conservation NGOs (the largest one in Flanders being Natuurpunt). This tenure structure presents specific difficulties for planning, conservation or management (Van der Aa et al., 2000), which the public administration addresses through subsidies. Simultaneously, ownership fragmentation is an element that hinders the success of such instruments (Serbruyns & Lust, 2003). In the last 20 years, the evolution of the proportion of private versus public ownership of forest areas shows a significant decrease in privately owned land and increased public ownership. This evolution is the result of a strategic decision of the Flemish government to increase the contribution of public bodies to nature conservation and protection. While the forest legislation prior to 1990 did not include any specific rights or obligations for forest owners, the Forest Act of 1990 introduced a new approach based on a "concept of ownership responsabilization". By establishing management plans, this approach generally favours stimulation of specific actions through (often financial) incentives over repressive measures (Van der Aa et al., 2000). New legislation applicable since October 2017 implemented a novel Integrated site-specific management plan (Geïntegreerd natuurbeheerplan) and associated subsidy system addressing all types of vegetation and goals (e.g., wood production, biodiversity protection, aesthetics). Accessibility to forests particularly is a public concern in Flanders, as private owners can easily forbid access to their land. Public authorities address this issue through subsidies for opening up private forests to the public. The Flemish population considers forest and nature conservation as priorities. Countless initiatives are organised in or next to forests (e.g., sport and cultural events, excursions, educational activities), and an increasing number of citizens is willing to pay to live close to a forest area (Liekens et al., 2013). In particular, hunting has been part of the socio-cultural fabric for a long time. Historically, hunting has been the second priority in forest management after wood production.

The few large privately owned forests are generally managed for timber harvesting and hunting and have been so for generations. However, in general, forestry and wood harvest do not have significant economic importance in Flanders. For the whole of Belgium, it represents only about 0,01% of the GDP (Vandekerkhove, 2013). Thus, private forests often remain unmanaged or harvested for firewood for personal use (Vandekerkhove, 2013). Other sources of income for forest owners come from subsidies. The Decree of the Flemish Government of July 14 2017 organises a subsidy system to support the planning, development and implementation of integrated nature management plans, fund measures for the realisation of Nature Targets or other investments, and opening up forest properties to the public. First of all, the yearly Basic Subsidy aims to support the realisation of the ecological end goals through yearly payments, which depend on the determined Nature Targets and the area to which they apply. There are also Additional Subsidies, such as the subsidy for Forest Conversion, which yearly allocates a set amount per hectare for the conversion of homogeneous non-native forests to mixed indigenous forests. Moreover, the Project Subsidy Nature offers a yearly subsidy for projects aiming to enhance the quality of forest habitats.

The forest political strategy of the Flemish Administration (which has full competency over nature management and policy) covers three aims: (1) forest conservation, (2) extension of the forest area, (3) multifunctional and sustainable management. Whereas the economic function of forests remains important, their social function for recreation and their ecological function in terms of forest conservation, improvement

and restoration now dominate (Vandekerkhove, 2013; Van Gossum et al., 2012). The policy instruments through which the Flemish Government aims to achieve these objectives are multi-actor, -sector and -level in nature and characterised by multiplicity (Bogaert, 2004; Vlaamse Overheid, 2019). Within the Department of Environment, the Agency for Nature and Forests (Agentschap voor Natuur en Bos - ANB) is in charge of nature conservation policy preparation and implementation, of the management of the natural areas owned by the Flemish Region and others by agreement, and of the enforcement of nature policy. The ANB cooperates with multiple sectors, such as private forest owners, the hunting sector, the agricultural sector and nature associations, engaging in both formal and informal participatory processes. In the IA, three main sectors participated in the development of the IMs. Forest owners participated through one of their three independent but aligned representative organisations. APB-NB is an interest group for large and small private nature managers and owners and ensures the latter's involvement on the policy level in general and in case of particular concerns. The agricultural sector has been a dominant actor in both the formal and informal participatory processes for nature policymaking. Boerenbond is the largest farmers Union in Flanders and often represents the agricultural sector at the policy level, not without tensions or conflicts. Nowadays, the primary sore points are the strict and controlled regulation related to nature affecting farmers and the tendency of governmental actors to allocate agricultural land to nature because of scarcity in open space are (VILT, 2020). In addition, the agricultural sector strongly contests the regulation regarding the compensation of damage caused by wildlife. The hunting sector, in general, has strong ties with the public administration. The ANB's perspective is that "hunting needs nature and nature in Flanders also needs hunting" (ANB, 2019h, p.1). Many hunters engage in nature management through game management and habitat restoration measures and consequently are eager to be recognised as important actors in nature governance. However, until recently, there were no subsidy schemes directly aimed at hunters despite the perceived eagerness of the hunters to participate (ANB, n.d.). This situation might be changing as the current Flemish governmental agreement includes enhancing the hunting sector's involvement in nature policy and management (Vlaamse Overheid, 2019). However, the Flemish society is highly polarised around hunting, as controversies and heated public debates occasionally arise.

Design and implementation process

Four successive phases can be identified throughout the design and implementation process of the two Belgium/Flanders IMs. Distinguishing these four phases contributes to highlighting the main decisions, events, and turning points in the development of the IA. For an overview of the two implemented IMs see Table 2.

Phase 1: Framework Establishment of the Reverse Auction Pilots – January 2018 to October 2018

Before the launch of the SINCERE project in 2018, a KU Leuven Professor approached the Director of Natuurinvest with the idea of testing the reverse auction as a more efficient approach to subsidy allocation for FES in Flanders together as project partners within SINCERE. This conversation triggered the interest of the public sector to experiment with an alternative approach that might enhance the administrative and especially cost-efficiency of the current subsidy system, an important objective of the current Flemish Government (Vlaamse Overheid, 2019). Several bilateral meetings were then organised with thematic experts of the ANB to identify options of FES fulfilling the conditions set by the Board of Directors of the ANB: the topic should not be politically sensitive nor already targeted by existing subsidy schemes. As a result, the IA leaders selected nine suitable FES, and the Board of Directors of the ANB selected two hunting-related FES: habitat restoration and improvement in forested hunting areas and wild boar buffers in

between cornfields and forest edges. The choice was influenced by the possibility of the newly created Hunting Fund to finance the pilot projects. The IA leaders combined each selected FES with a different reverse auction type, among the mechanisms described in the Danish study of Thorsen et al. (2018): the habitat restoration and improvement pilot would work as a 'discriminative reverse auction' (hereafter referred to as Habitat Auction) and the wild boar buffer pilot as a 'first rejected price reverse auction' (Buffer Auction).

Phase 2: Participatory Development of the Reverse Auction Pilots – October 2018 to May 2019

In the framework of SINCERE, the participatory process unfolded in four MAG meetings spread over four years. The scope of the decisions open to deliberation was limited because all options needed the legal approval of the ANB. The choice of the reverse auction mechanism and the targeted FES were non-negotiable. The questions open to deliberation and co-creation with the participants were the type of habitats to restore, the characteristics of the buffer strips, the measures to implement and organisational issues related to the auctions (such as governance, pricing, contracts). The IA leaders thus chose to form an executive working group instead of a broad participatory process. The selected core group included representatives of partners and key stakeholder organisations of the public sector (Natuurinvest and the ANB), academia (KU Leuven), the hunting sector (the HVV), the agricultural sector (the Boerenbond) and private forest owners (the APB-NB). Although the participation of the nature conservation sector was also considered important, the representative of Natuurpunt only attended the first meeting.

During the first MAG meeting in October 2018, the stakeholders were informed about the project and brainstormed together about both FES and types of reverse auction pilots. After this MAG, the IA leaders refined the reverse auction pilots and drafted the implementation documents together with ANB. During the second MAG meeting in April 2019, participants examined and discussed the implementation plan for the reverse auction pilots. Among others, the issue of the comparability of the biddings for the reverse auction pilot for habitat restoration and improvement was raised, which led to the adaptation of the reverse auction mechanism. This process eventually led to two implementable reverse auction projects and a schedule foreseeing the launch of the call for bids in June 2019.

Phase 3: Official clearance and implementation of the First Call of the Reverse Auction Pilots - June 2019 to December 2019

The pilots' implementation procedure had first to be approved by the subsidy department of the ANB, then both the Cabinet of the Flemish Minister of Justice and Enforcement, Environment, Energy and Tourism and the Interfederal Corps of the Inspection of Finances (Inspection of Finances) (Therry, 2018a, 2018c). The Inspector of Finances did raise concerns about the compliance of the uniform reverse auction type with the principle of generosity (Therry, 2019). In essence, this principle entails that the government cannot grant people more financial means than requested (Inspection of Finances, 2020). Consequently, the approval of the Buffer Auction became conditional upon legal clearance of this issue, which was granted after an investigation by a contracted law firm. Meanwhile, the Hunting Fund and its steering committee were also formally established, and the appointed members approved both the reverse auction pilots and the implementation documents (HVV, 2018; Therry, 2018a). The pilots were thus ready to be launched. However, at the same time, the debate about the hunting sector was severely stirred up by the presumed involvement of the sector in the death of the wolf Naya and her cubs, the first wolves seen in Flanders in a hundred years (e.g., Landbouwleven, 2019). This controversy led to a severely delayed launch of the

reverse auction pilots in November 2019 (ANB, 2019c, 2019b) and the reduction of the broad communication strategy planned (e.g., press releases) to more direct communication to the potential bidders only.

The call of the Habitat Auction led to a decent number of biddings by primarily consultancy bureaus or Forest Groups in the name of private forest owners or owners themselves. A jury composed of four members of the ANB, guided by the representative of the IA leader, made a selection, sent for official clearance to both the Cabinet of the Flemish Minister of Justice and Enforcement, Environment, Energy and Tourism, and the Inspection of Finances. Despite delays due to COVID-19 and the pilots' low priority on the political agenda, the approval was eventually granted. The selected private forest owners have received the first instalment and performed most of the proposed measures in Spring 2021. The measures postponed to the autumn of 2021 will, however, require governmental clearance for implementation extension.

The call of the Buffer Auction attracted a limited number of biddings by solely individual farmers in agreement with the hunters operating on their fields and the landowners. Many of these farmers received the aid of the consultants of the Boerenbond in the formulation of their bids. This limited number of biddings made it impossible to come to a first rejected price through the mechanism's procedure, particularly while ensuring to avoid breaching the conditions imposed by the Inspector of Finances. Theoretically, in a first rejected price reverse auction, a sufficient number of bidders is necessary to ensure the necessary competition to low price/cost-efficiency for the buyer (Thorsen et al., 2018). The literature on reverse auctions already identifies that low participation and insufficient bids most likely lead to the auction's failure (Schilizzi, 2017). The conclusion that it would be impossible to continue with the selection without breaching the regulation approved by the Flemish Government led the IA leaders to cancel the call of this pilot for wild boar buffers.

Phase 4: Modification and Implementation of the Second Call of the Buffer Auction Pilot – January 2020 to December 2020

During the consultations after the closure of the bidding period for the first call of the reverse auction pilots in January 2020, the idea of launching a slightly adapted version of the Buffer Auction in a second call took hold. Adjustments to the first call comprise the selection procedure to come to a first rejected price in case of a limited number of biddings and an increase in the number of eligible municipalities (Therry, 2020). Adjusted concept and implementation plan and documents were then sent for feedback and discussed in a meeting with all the partner and stakeholder organisations. Nevertheless, the second call attracted a limited submission of biddings again. The adaptations made allowed for the selection procedure to be performed nonetheless. The selection of bids and the resulting budgets were presented to both the Cabinet of the Flemish Minister of Justice and Enforcement, Environment, Energy and Tourism, and the Inspector of Finances for official approval. Unfortunately, the advice of the Inspector of Finances was negative because of a perceived breach of the principle of generosity.

Table 2 Description of the two implemented IMs for IA Flanders/Belgium

	Habitat Auction	Buffer Auction	
		First Call	**Second Call**
Description	Call for measures that restore or improve the ecological conditions or natural values on hunting grounds in or near forests	Creation of one-year shooting strips consisting of low vegetation in between cornfield and forest borders on hunting grounds to heighten the visibility of wild boar for hunters	
Objective	Measures should benefit game species by enhancing their habitat: wide variety of potential measures, such as removing excess nutrients or improving structural diversity.	Raise the threshold for wild boar to go into the corn fields and heighten the visibility of wild boar for shooting, which should: • help to control the population of wild boars to reduce the damage that wild boars cause to corn fields and forests • alleviate the environmental pressure of agriculture on forests' edges • enhance landscape variety.	
Auction mechanism	Discriminatory reverse auction mechanism.	Uniform first rejected price reverse auction mechanism.	
Selection procedure	Bidders could propose implementing one or a set of measures in return for one of three price categories: 5.000, 10.000 and 15.000 euros. Admissible biddings were then allocated a score based on their evaluation on four weighted quality criteria: 1. the impact on hunting and involved game species (forty percent), 2. on local ecological problems (twenty percent), 3. on landscape ecological relationships (twenty percent), 4. and on rare and endangered species, habitats and small landscape elements in forests (twenty percent). Biddings with an overall quality score of seventy or above were ranked based on this score and selected until the budget of 100.000 euros, coming from both SINCERE and the Hunting Fund, was exhausted.	All bidders determined their unit price per square meter of wild boar buffer and have to consider all their costs and benefits in the calculation. Admissible biddings were then ranked based solely on this price criterium and selected in that order until the exhaustion of the budget of 50.000 euros of the Hunting Fund. All bidders would receive a uniform price per square meter of wild boar buffer: the price of the first withheld bid or, in other words, the first rejected price	Creation of two additional rules to prevent blockages: • in case of similar proposals for unit prices: priority would be granted based on surface area and if necessary, timing of the submission. • in case of a limited number of biddings: the budget (reduced to 20.000 euros) would be lowered in tranches of 25 percent until a first rejected price is reached. If the budget were lowered by more than 75 percent, the call would be terminated.

Sustainability analysis: main strengths and challenges

A topic of high relevance in the institutional context

All the stakeholders interviewed described the reverse auction as an instrument with plenty of potential to address Flanders' increasing wild boar population. Currently, no other mechanism, auction, contract or subsidy seem to address the issue sufficiently and efficiently.

Cooperation of stakeholders and recognition of the role of hunters in nature management

One of the main motivations and successes of the IA has been bringing together different stakeholders, especially the hunters, as legitimate actors in nature management and working towards a common objective. In the words of the IA leader, "Different players involved in the project (nature conservationists, hunters, farmers) have different and sometimes (apparently) opposing interests. Discussions in the past were therefore difficult at times, each party defending its own interest. This project allows to bring those parties together around a common challenge: better nature for better hunting possibilities (and vice versa), better buffering between nature areas and agricultural land allowing to protect both forests and agricultural lands from damages generated by an increasing number of wild boars" (representative Natuurinvest, interview, February 18, 2021). However, it is important to note the absence of the nature conservation NGOs, Natuurpunt, probably because of the constraints and decisions already made at the start of the project and a reluctance to the reverse auction mechanism.

A focus on positive ecological impact and the challenge of technical and spatial requirements

Throughout the development and participatory process, efforts have been made to integrate ecological concerns into the design of the IMs. The Habitat Auction primarily focuses on enhancing the ecosystem structure (including stand structure) and, more specifically, biodiversity and forest vitality. The IA leaders and stakeholders drew a list of admissible interventions in the biddings, explicitly aiming to improve and restore natural values and ecological conditions that benefit game and other rare or endangered flora and fauna. Biddings were also selected based on quality criteria targeting this same goal. In the Buffer Auction, the eligibility criteria required for the biddings were difficult to reach, notably in the area targeted by the first call (excluding Vlaams Brabant). The requirements have complicated the application process and drastically restrained the number of eligible candidates. Due to the focus on forests of SINCERE, the fields offered for the creation of shooting strips should have at least 50 meters of borders with a forest, a characteristic that proved to be uncommon. Therefore, biddings often required collaboration/agreements between farmers of adjacent fields to reach the required 50 meters threshold.

Technical and administrative complexity: the need for intermediaries and the risk of inequity

The issues related to the auction format and its technical complexity seem to have deterred farmers, forest owners and hunters from participating in the call. On the one hand, according to the stakeholders, explaining the reverse auction concept was not a simple task. On the other hand, besides the challenge of explaining the auction itself, the administrative procedure generated concerns among possible bidders: submitting a bid required filling a dossier presenting a detailed technical proposal. As a result, some farmers and forest owners decided to hire a consultant to help them to prepare the dossier, which generates a disadvantage for those who could not afford this option. Some sectoral organisations (e.g., Boerenbond) have been able to help with this matter, but some other have not, increasing the risk of inequity in access to the mechanism.

Timing: delays and mismatches between sectoral calendars

The time needed to set up the Hunting Fund's steering committee and obtain legal approval of the implementation documents caused some delays in launching the auctions' first call. Moreover, the public controversy around the death of the wolves forced the communication office of ANB to postpone the launch of the call further and limit the communication to key stakeholders instead of a broad audience. Consequently, the time granted to submit bids had to be shortened. Mismatches between the timing of the call and the annual calendar of the key stakeholders' groups seem to have been detrimental to the success of the first call. Indeed, farmers need to develop a crop production plan a year in advance to obtain the necessary permits, seeds, machinery and seasonal workers. Furthermore, as each crop is different and legislation requires associating certain crops with specific plants, launching the project in November was too late for some farmers to have the necessary room for manoeuvre. Representatives of the hunting and private forest owners report similar problems. The hunters were in the middle of the winter hunting season at the time of the call and the info sessions organised by ANB.

Local culture and innovation

Despite the trust of the public administration in the economic theory behind the reverse auction mechanism, the novelty of the mechanism itself might have harmed the pilot project's success. As it was an experiment with no similar precedent in Flanders, the absence of pre-existing successful cases and examples did not help dissipate stakeholders' potential doubts.

Institutional challenges.

The two pilots were designed with two different variants of the reverse auction mechanism. The Buffer Auction, in both calls, is very similar to the theoretical model from which it was inspired: the first rejected price reverse auction (Thorsen et al., 2018). This particular mechanism consists of ranking the bids from the cheapest to the most expensive and select them in that order until reaching the predefined budget, subsequently allocating the price of the first rejected bids to all bidders. However, it is doubtful that the mechanism itself complies with the public funding rules, hence its cancellation on account of a suspected violation of the "zuinigheidsbeginsel" (generosity principle: avoidance of unnecessary burden on the public budget). Furthermore, the limited results of the biddings did not provide a sufficient basis to prove the cost-efficiency of the mechanism, leading the inspector of finance to give negative advice on the continuation of the project.

The Habitat Auction is an adaptation of the discriminative reverse auction model. As Thorsen et al. (2018) described, in this type of auction, bids are often selected based on quality criteria, and the selected bidders receive the price requested in their bids. Setting three fixed price categories was not in the original plan. As the IA leader states: "It is far more similar to what exists today, with the habitat restorations, we can have three amounts (5000, 10000, 15000 euros) we say 'what do you want to do for that amount. This is very similar to some public procurement and subsidy system that already exist. Working with these envelopes is a serious adaptation of the theoretical model" (representative Natuurinvest, interview, February 18, 2021). This substantial difference is due to the choice of habitat restoration and improvement as targeted FES. Like in many subsidy schemes for nature management in Flanders, the measures in question are diverse and invite disparate proposals. Therefore, having these three categories of prices – as suggested by a stakeholder during a MAG meeting – was considered useful to compare the bids. This similarity to the current subsidy systems might be behind its success.

Conclusions: impact and future perspectives

Measures and recognition of the hunting sector as nature manager

Despite the low number of bids submitted to the Buffer Auction, the interest shown by the key stakeholders, especially farmers, in the wild boar buffers could be the first step towards integrating these measures into the existing subsidy system for nature governance in Flanders. Similar buffer strips were implemented in the fields before the reverse auction pilot, yet without any compensation or subsidy. Given the costly and largely uncompensated damages caused by an increasing wild boar population, farmers and their representatives show a strong interest in financial mechanisms that could fund more preventative measures against wild boar damage (e.g., ANB, 2019b; Rutten et al., 2019).

Although one of the main interests of the hunting sector was to join the IM design and implementation process as a means to increase their public recognition as important actors in nature management, the impact of the IA in this respect is limited. Communication campaigns initially aimed to raise awareness and improve the public perception of hunters. However, unexpected events forced the IA leaders to limit communication to the bidders to avoid increasing the controversies revolving around hunting after the disappearance of the wolves.

Reverse auction mechanisms and cost-efficiency rationale

According to the IA leaders, the first rejected price reverse auction mechanism, tested with the Buffer Auction, will most likely disappear from the nature governance scene. From the beginning, most pressures were put on the first rejected price reverse auction mechanism because it was considered a completely different manner of allocating subsidies. However, despite two attempts, the mechanism could not be fully tested. The inability to come to a first rejected price due to a limited number of biddings led to the termination of the first call. The Inspection of Finances also halted the second call because the limited number of bids made it impossible to prove cost-efficiency and, consequently, compliance with the principle of generosity.

Although repeating the Habitat Auction (discriminatory reverse auction) might be difficult, there is the possibility of bringing some elements of this action into the current Flemish subsidy system for nature. For example, to increase cost-efficiency, the public administration might consider including price as an evaluation criterion in current subsidy schemes, which focus mainly on comparison/competition through quality criteria. Initially, the IA leaders considered the Habitat Auction to be less radically innovative, more similar to the existing schemes, and somewhat complex. However, the experiment with the Habitat Auction might open the way to the large-scale alteration of the subsidy system through the addition of price as an assessment criterion in subsidy schemes. This change would nevertheless only be considered in the mid-term after further evaluation of the measures' impact on the biotope restoration.

4.5.2 In-depth look at IA Spain/Catalonia SSA

The IA Spain/ Catalonia consists of a two-fold action to strengthen the link between forest and water governance. It takes place in the province of Lleida, in the area surrounding the Rialb reservoir, which is the most recent water reservoir in Catalonia, located in the watershed of the Segre River, affluent to the Ebro. The IA leader is the *Centre de la Propietat forestal* (CPF), a public entity attached to the Department of the Environment and Housing (DMAH) of the Generalitat de Catalunya. The CPF promotes forest management in privately owned forests and mediates the collaboration between the administration and the forest owners and managers. The starting point of the IA lies in the underestimated impact of forest management on water

provision, both in terms of water quantity and quality. The overall aim of the IA is to integrate or increase considerations for FES provision, particularly water-related FES, in forest management and territorial planning and diversify funding sources for forest management.

The IA adopted a broad participatory approach aiming at co-creating a locally relevant IMs. The first MAG meeting gathered multiple stakeholders to discuss the issues at hand and identify potential solutions collectively, and it concluded in the selection of two IMs. The first IM targets the recognition of forests as ES providers and the integration of the crucial role of forest management in the legal planning instrument for the reservoir. This official acknowledgement of the link between forests, forestry and water into legislation is the first step necessary to support the implementation of any FES financing mechanism, such as PES schemes. The second IM consists of designing a local 'forest and water' fund to promote multifunctional forest management in the area.

This section presents an analysis of the IA based on the data collected in SINCERE (screening, SSA, and MAG reports), scientific literature, and meetings with IA leaders. First, we present the context of the IA, which corresponds to an ex-ante sustainability assessment covering ecological, social, economic, and institutional dimensions. Second, within this context, the IMs were developed through a process that we present in 5 phases: (i) problem framing and participative brainstorming, (iii) participation in the elaboration process of the PDU, (iii), design of a local fund for forests and water (iv) creating synergies and setting up the conditions for implementation, and v) consolidation and concrete steps towards implementation. Third, the analysis of the IA highlights the substantial stakeholders' engagement, territorial strategy and ecological approach and presents some of the remaining uncertainties related to economic sustainability. Finally, we conclude with an overall assessment of the IA and a reflection on the post-SINCERE outlook.

Presentation of the IA's context

The Rialb water reservoir: characteristics and history of the project and its surroundings

The water reservoir located in the Rialb valley is the second-largest and the most recent reservoir constructed in Catalonia. Although the project dates back to the 1960s, the reservoir's construction began only in 1992. The thirty-year delay is due to the local communities' strong opposition to the expected impacts of the project, related specifically to the relocation of nearly 300 inhabitants and the submersion of the lowest and most fertile pieces of land. Eventually inaugurated in 2000, the Rialb reservoir has a 400 hm^3 capacity and provides water to 80 municipalities through the Segarra-Garrigues Canal and the Urgell Canal.

In 2008, the Consortium Segre-Rialb was created to coordinate the economic development and tourism promotion of the six municipalities surrounding the reservoir: La Baronia del Rialb, Bassella, Oliana, Peramola, Ponts, Tiurana. The objectives of the Consortium are to promote the dam and its natural environment and cultural heritage to increase the touristic appeal of the area and generate economic activities in the affected municipalities. The Rialb reservoir is surrounded by municipalities with a high forest area (88%), above the average 60% in Catalonia. Thanks to the touristic appeal of the water reservoir, the forested landscape aesthetics and opportunities for hiking and mushroom picking, tourism is a high source of income in the area. For instance, La Baronia de Rialb counts the highest number of rural tourism homes in Catalonia, with over 150 *masies* (rural homes).

The productive forest function consists of wood harvesting from uneven-aged forests. However, forestry is limited because it is considered non-profitable activity. Besides the typical low productivity of

Mediterranean forests, the complex topography of the area and inaccessibility of some of the most productive areas make harvest operations difficult, thereby reducing profitability. In addition, many forests require investment to become productive in the mid-term. This characteristic is particularly relevant in a region where around 80% of forests are privately owned. Nowadays, truffle production is the most profitable productive forest activity in the area.

A continuous process of rural exodus has led to a significant decrease in the local population in the past century. For instance, La Baronia de Rialb evolved from 1244 inhabitants in 1900 to 835 in 1950 to the current 240 inhabitants in 2016. Like in other Mediterranean countries, this rural abandonment has caused a forest transition in the last sixty years (Cervera et al., 2019): depopulation, associated with decreasing agricultural activities, has induced land-use change and led to land abandonment, with former fields naturally evolving to new forests. Consequently, forest surface increases in the region (National Forest Inventory, IFN3) while forest management is very low. The current estimated annual increment of forest growing stock is 3.1 m^3/ha/year while the annual harvests remain at 0.7 m^3/ha/year, which results in an average harvesting intensity ranging from 20 to 25% (Baiges, 2018). Only 36% of the total private forest lands are under a forest management plan, and this proportion is highly variable between the six municipalities in the area (Baiges, 2018). However, the highest percentage of 47% of private forests under management plan in La Baronia de Rialb is due to the recent increase in truffle production in the municipality over the last decade. Eventually, the unmanaged forest growth increases the risks of large forest fires, diseases or mortality during drought episodes, problems exacerbated by climate variability and change.

Relationship between forests and water and specific issues in the Mediterranean region

Regulation of the hydrologic cycle is one of the FES with the highest relevance in the region as 'most climate change projections show important decreases in water availability in the Mediterranean' (Pascual et al. 2015, p. 2132). The combination of several factors such as decreasing precipitation, increasing temperature and potential evapotranspiration (Pascual et al. 2015), as well as land cover changes and increasing vegetation and expected growth in water consumption, will severely affect water availability and streamflow. In Catalonia, a 'general decrease in streamflows and a higher frequency of hydrological droughts' are already observed (Pascual et al. 2015, p.2133). During the last decades, a flow decrease has been measured in the Ebro river basin. Among the key reasons identified for this are the water consumption of the new forest areas and the increase of forest biomass. To strengthen the capacity of the forest to mitigate the effects of change climate, specific forest management practices are promoted: thinning measures are expected to reduce overall water consumption and improve forest growth performance (by decreasing competition between trees). 'Managers are recommended to follow a more intensive management which reduces canopy density. The effect of this is a decrease of competition between trees, more water available per tree and better overall growth performance' (Muys et al., 2013, p.7).

Awareness among local stakeholders regarding the links between forests and water, in general, is weak. Very few of them know the impact forests and forestry may have on water, and even less the two-way relationship between forests and water: while tree cover in the basins is essential to water quality, increasing vegetation cover impacts the efficiency of water use by forests, thereby potentially decreasing water availability for humans. Nevertheless, the starting point of the IA in Catalonia is that multifunctional forest management can increase forest vitality, reduce the risk of loss of forest cover due to mortality or fire, and reduce forest water consumption to ensure water availability as well as quality.

Design and implementation process

This section presents the process through which the IA Catalonia/Spain unfolded, organised into five main phases. Naturally, some phases partly overlap since the two IMs evolved in parallel. Nevertheless, distinguishing these five phases contributes to highlighting the IA's main events, decisions, turning points, and achievements.

Phase 1: Problem framing and participative brainstorming of potential solutions – January 2018 to March 2019

The IA's participatory process included four MAG meetings spread over four years. The process has been highly participative since the very beginning and has enabled collective decision-making. On November 7, 2018, the first MAG meeting was organised at La Baronia de Rialb, in the form of a 'workshop for identifying mechanisms to valorise the services provided by forests and forest management in relation to water'. Forty persons participated in the event, representing the main stakeholders at several spatial and administrative scales, such as diverse regional and local public entities (e.g., Catalan Office of Climate Change, Departments of the Province of Lleida and the Catalan Generalitat, local municipalities), individual forest owners and representatives of forest organisations (e.g., Forest Consortium of Catalonia, PEFC), actors in water governance (e.g., Catalan Agency of Water, Ebro Hydrographic Confederation), and representatives of farmers unions, nature, tourism and rural associations, research (e.g., CTFC, University of Lleida). The first MAG meeting aimed at initiating an active dialogue between all actors involved in water and forest governance and territorial planning/rural development in the region and discuss the need for an innovative action to improve water provision. A full day was dedicated to collectively envisioning future scenarios for the Rialb reservoir area and co-create possible actions to take, accounting for related risks and opportunities. This brainstorming phase brought forward two IMs to be implemented as pilot exercises in the area of the water reservoir of Rialb.

The participants highlighted that strengthening governance amongst the different sectors involved (water, forests, territory) was a pre-condition to implementing any PES-like IM. Therefore, they identified as a first IM a participatory joint water-and-forest planning. Simultaneously, the elaboration of the Urbanistic Masterplan of the water reservoir (Plà Director Urbanistic - PDU), a legal requirement following the construction of the dam, had recently started. The participants identified this occasion as an excellent opportunity to work towards acknowledgement and inclusion of the link between forests and water through FES and forest management in an official planning document. Moreover, the participants discussed the need for an incentive mechanism to support forest management in the area. They thus explored and selected the idea of designing a local voluntary fund for forests and water as the second IM. Overall, a core value emerged from this first MAG: enhancing and supporting co-responsibility.

Phase 2: Participation in the elaboration process of the PDU and outcomes – 2018-2019

The elaboration of the Urbanistic Masterplan of the Reservoir (Plà Director Urbanistic de l'embassament de Rialb) was coordinated by the Regional administration through a participatory process involving multiple local stakeholders, from public institutions (provincial and municipal councils) to local associations and around 172 local inhabitants. Five main participatory workshops were organised and a mechanism called the 'iterant box' (Caixa itinerant) was deployed through the six municipalities around the reservoir to collect inhabitants' suggestions. The Consortium Segre-Rialb played an important role in launching the process with the Generalitat of Catalonia. The president of the Consortium is a renowned forest owner in the area, the mayor of La Baronia de Rialb, very active and with whom the IA leaders had already worked in the past.

The Forest Ownership Centre-CPF also stayed in close contact with the editors of the PDU, who actively participated in the 2nd MAG meeting, collecting the ideas raised during the discussion.

The participatory process for the elaboration of the PDU took place in 2018 and 2019. In the perspective of the IA, participation in the PDU served as an opportunity to publicly present the water-forest related issues in Catalonia, to enhance local governance and to achieve a written recognition in a legal document of the role of forestry in water, landscape conservation, tourism and the local economy. In January 2020, the Urbanistic Masterplan was eventually finalised and approved, including multifunctional forest management as a key element of the territory and recommending the elaboration of economic instruments to support FES provision (Table 3).

Table 3 - Extract from the PDU - Pla director urbanístic de l'embassament de Rialb (Translation Teresa Baiges)

Strategic objectives of the URBANISTIC MASTERPLAN (1 of 7):	To integrate Multifunctional Forest Management as a key element of the territory, understanding forestland in the Segre-Rialb watershed as a provider of ecosystem services, which should have guaranteed its viability and should be promoted as an economic asset capable of generating green jobs in rural areas.
Article 39, on Forest Management:	The Plan recommends the production of Forest Management Plans at landscape level where priorities in relation to the provision of FES are set, according to these 4 principles: - To enhance the value of the cultural landscape through its active management - To use forest planning as a basic mechanism to set priorities related to FES - To look for sinergies between the provision of FES and Climate Change mitigation and adaptation policies (i.e km 0 biomass provision) - **To identify and promote financing mechanisms and economic instruments to ensure the provision of priority FES, as agreed by all stakeholders.**

Phase 4: Creating synergies with other projects and setting up the necessary local conditions for implementation – January 2020 to March 2021

Building on the framework set up by the PDU recently approved, the IA leaders worked in collaboration with the president of the Consortium Segre-Rialb on a broad territorial planning strategy for a 'resilient landscape in the Mig Segre basin'. This strategy pursues the core objectives set in the PDU, focusing on the promotion of multifunctional forest management as a backbone of the territory, recognising FES as ecological and economic assets, and of a landscape approach to preserve, manage and enhance the territory. The strategy integrates the IA developed in SINCERE and the LIFE Climark project. The LIFE Climark project aims to promote multifunctional forest management for climate change mitigation by designing a local Climate Credit Market to increase carbon fixation rate, water resources and biodiversity. The promotion of multifunctional forest management will go through several actions: i) the creation of an association of forest owners as main promoters of a resilient landscape, ii) the drafting of a PROMACC, Forest Mitigation and Adaptation to Climate Change Project, iii) quantification and modelisation of the impacts of forestry measures on FES, iv) search for (in)direct beneficiaries of the targeted FES to support/fund the IA in SINCERE and companies to test transaction on the climate credit market in LIFE Climark.

When the Covid-19 hit Europe, the IA in Catalonia was thus at a crucial moment. The third MAG meeting was scheduled for April 21 2020. It was preceded by preparatory meetings, the most important of which, to be held on March 27, aimed to gather local forest owners around creating a forest owners association that would host the fund. However, the lockdown interfered severely with these plans. A third MAG meeting was conducted online, although restricted to the actors most directly involved. However, the meeting with forest owners had to be postponed until face-to-face meetings were allowed. Indeed, most forest owners in the area are over 65 years old and lack skills in online meeting technologies. The IA leaders sent an invitation to local forest owners in the fall of 2020, promoting the creation of a forest owners association. Around the Rialb reservoir, FES providers are small private owners accounting for more than 90% of the whole forest area. There are around 1.000 forest owners with an average forest size of 8.2 hectares. The creation of association aims to ease the participation of small owners in funding mechanisms such as the 'Forest and Water' fund or climate credit market by reducing individual transaction costs, thereby reducing potential inequities in access.

The IA leaders have then started to draft a PROMACC proposal based on the objectives of the PDU, environmental information and available IOFs, data processing and the incorporation of the LIDAR technique and mitigation synergies already initiated in the field of study. This PROMACC to be made with and approved by the forest owners association includes planning different forest treatments to be implemented in the next three years on 20 hectares. For each of the treatments, the impact on water provision as well as on carbon balances and biodiversity hosting capacity has been calculated. These treatments aim to improve the resistance and resilience of the forest and will be implemented in winter 2021-2022.

Phase 5: Consolidation and concrete steps towards implementation – April 2021 to December 2021

On May 27, 2021, a group of key stakeholders from several policy sectors, public administrations, agricultural and forest sectors gathered online for the fourth MAG meeting. The objective of this last participatory meeting in the framework of the SINCERE project was to finetune the design and next steps of implementation of the 'forests for water' fund.

The IA leaders presented the provisional governance structure of the fund (Figure 18), resulting from the outcomes of the previous MAG meetings and the report provided by INSTA's legal services. During this last meeting, the stakeholders finetuned the identification of the measures and costs to fund and the beneficiaries to contact.

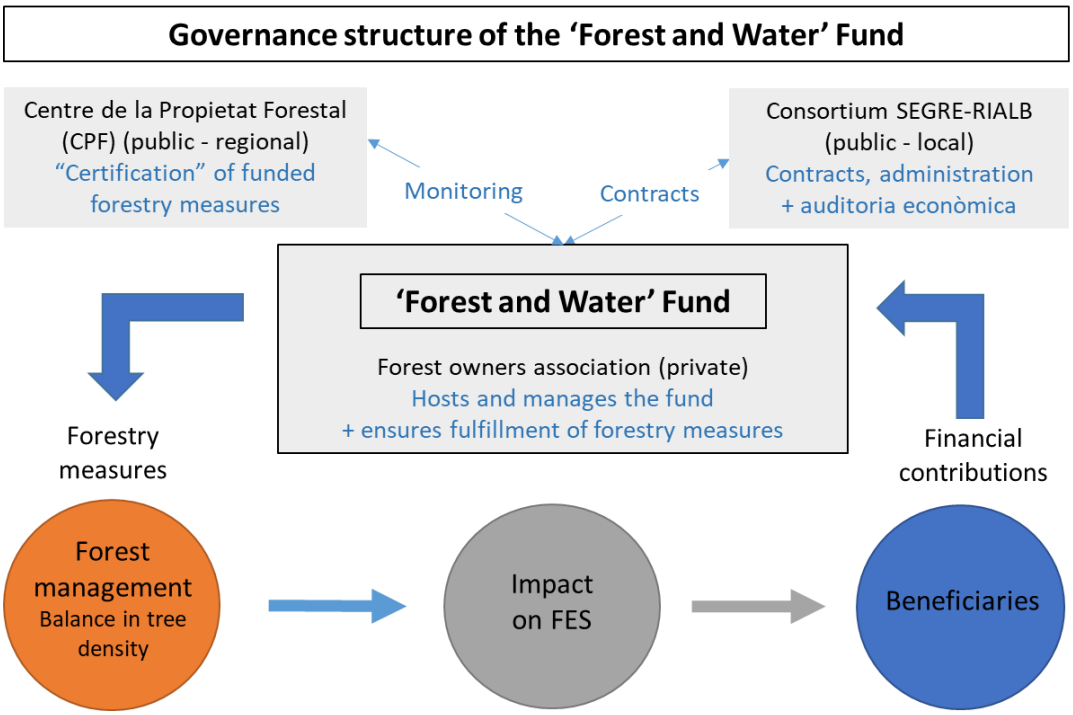

Figure 18 Visual representation of the fund's governance structure, as presented at the fourth MAG meeting

On June 4 2021, the IA leaders organised a meeting in La Baronia de Rialb with local forest owners to discuss the creation of the forest owners association. This meeting consisted of an open discussion between the forest owners on their views and expectations on forest management in the area.

The IA leaders organised a participatory exercise to collectively design the role and objectives of such an association, including the six municipalities of the Segre-Rialb basin. There exists already one forest owners association in the municipality of La Baronia de Rialb. However, to fulfil the PDU and the IA's objectives, a larger association is needed to include the other municipalities. The IA leaders have paid consistent attention to this issue. The former MAG meetings involved four representatives of the local forest owners and the mayors of the six municipalities, who are also forest owners. Eventually, although postponed because of the Covid-19 crisis, the meeting to create or enlarge the forest owners association has been a successful step forward.

Sustainability analysis: main strengths and challenges

A broad participatory and transdisciplinary process

One of the main objectives of the IA in Catalonia was to carry out a genuinely co-creating process from the initial stage until implementation in order to develop shared values, understanding and objectives among the stakeholders who will take part in the IM. The CPF paid particular attention and dedicated much effort to contact, motivate and gather a large diversity of actors from different sectors and scales and create the conditions necessary for transparent discussion and collaborative work. The IA leaders strived to create a transdisciplinary process, including as many relevant local and regional actors as possible, across sectors

and disciplines. Furthermore, they paid attention to creating the conditions for a meaningful dialogue between research and action, between academic and local knowledge. In addition to the wide variety of participants, the MAG meetings have included concise inputs from research: on the links between forests and water (by Teresa Baiges, CPF, first MAG), critical legal and economic issues in funds design and examples of existing legal structures (by Joan Pons, INSTA, second MAG) and lessons from similar PES schemes (by Esteve Corbera, ICTA-UAB, fourth MAG meeting).

The crucial first step for transdisciplinarity is framing the problem collectively and building a collaborative framework (Lang et al., 2012). In this perspective, the IA leaders hired external facilitators to create a collaborative mindset in the first MAG meeting, with CPF representatives contributing to the co-creation process in the same way as the other participants. This external facilitation and the careful preparation of exercises with the facilitating team contributed to ensuring an efficient discussion and more accessible and equitable communication between the participants by mitigating some of the potential power relations. Overall, transdisciplinary processes require a delicate balance between, on the one hand, careful preparation of each workshop and skilled facilitation to allow for effective collective work and, on the other, flexibility to adapt to what emerges from the collective.

The CPF succeeded in leading one of, if not the most, significant participatory processes carried out in SINCERE. Time is another essential ingredient of participative processes. For instance, half a day in the first MAG meeting was dedicated to exercises including ice-breakers and 'role-playing' to introduce the participants to each other. Moreover, the involvement of the stakeholders throughout the process tends to indicate the achievement of a certain level of shared understanding and objectives. Besides, a core value of co-responsibility emerged clearly in the first MAG meeting and became a frequent reference throughout the process. The IA leader stated that ‘the co-responsibility feeling was clear in all meetings, and has led to other unexpected collaborations’.

Embedding the IA in a broad territorial vision - Synergies with other initiatives and enhancement of local and cross-sectoral governance

Another notable achievement of the IA leader is the successful integration of the IA in a larger territorial vision. Links were made early on between the processes of the Urbanistic Masterplan, the SINCERE and LIFE Climark projects and the creation of a forest owners association. This strategy results in a coherent territorial vision and synergies between like-minded actors and projects. According to the IA leaders, very satisfactory progress has been made in connecting key institutional actors, raising awareness of the forest-water nexus at the local level and creating fruitful discussion between the public water and forest sectors.

Moreover, much effort has been made throughout the IA to strengthen local governance and include new and existing organisations in the governance of the future fund. Encouraged to self-organise in an association, the local forest owners have collectively set their objectives and the association's role. The Consortium Segre-Rialb has been a key partner in developing the IA and will be the local administration providing administrative support to the forest owners association after the SINCERE project lifespan. Unfortunately, it is too early in the implementation process to determine if the networks created and the sense of co-ownership of the project will be strong enough to ensure a lasting implementation of the fund. Nevertheless, the integration of the multifunctional management of forests as FES providers, as a strategic objective in the PDU, and the synergies created between the local and regional actors can be considered achievements and assets for the future of the IA.

Holistic approach and solid scientific basis

The aim of the forestry treatments promoted in the IA is to improve the bundle of ecosystem services most threaten in the Mediterranean: water provision, carbon sequestration, biodiversity, and includes both mitigation and adaptation measures. Specifically, they consider fire resistance, soil conservation and increased tree vitality to face droughts (by reducing competition between trees). The PROMACC drafted by CPF adopts a landscape approach and thus define forest treatments that go beyond the forest-site scale, which is helpful to consider ES trade-offs.

The synergies created with the LIFE Climark project have strengthened the scientific knowledge of the links between forestry and water in the IA area. The Climark project provided robust methodologies to calculate the impact of forestry measures on water-related FES, especially for ecological and economic indicators. However, if the general biophysical models have been enough for the development of the IA so far, the collection of local data will be useful in the future to enhance the knowledge on the forest-water nexus and the specificities of the Rialb reservoir area.

Timing, delays and uncertainties

The downside of a widely participative process that includes co-creation from the very beginning is that it is time-consuming and can be expected to deliver concrete results in the mid- to long-term rather than the short term. Nevertheless, the IA evolved rather rapidly in the first two years of the SINCERE project. The IA leaders succeeded in gathering a large, diverse and enthusiastic group of stakeholders, leaning on related initiatives and creating synergies towards coherent territorial planning. When the Covid-19 crisis hit Europe, the IA in Catalonia was impacted at a crucial moment and risked losing the momentum. The switch to online meetings was inappropriate for some stakeholders: the meeting scheduled with the forest owners had to be postponed for more than a year until physical meetings were allowed again. The Covid crisis is also likely to have an indirect impact on securing funding for the IM. Most of the local companies envisaged as contributors to the IM have suffered from the economic crisis. The IA leaders foresee that it will complicate the search for funding despite the positive contacts made before the Covid.

Economic impact and ethical consideration

The IM has been designed and several steps towards implementation have been made, including the creation of the forest owners association that will host the fund. However, to date there has not been any financial transaction. The first transactions are not foreseen before the end of 2021, after contacting the potential private and public investors identified during the fourth MAG meeting. The economic efficiency and economic impact of the IA can thus not be assessed at this stage. However, the IM allows for a diversity of funding sources. Among potential contributors are many private actors, mainly water users (such as hydroelectric companies, water distribution), companies interested in corporate social responsibility, or beneficiaries of other FES (e.g., tourism sector). Searching for funding from public institutions which could validly dedicate a part of their budget to the fund is also still considered an option (e.g., provincial administration, the Catalan Agency of Water). However, during the MAG meetings, some participants raised a question that will require attention in the near future. This issue relates to the introduction of ethical criteria to participate in the fund and the risk of 'greenwashing' if some companies were to use their participation as a way to compensate for high environmental impacts (e.g., high water consumption or CO2 emissions).

In addition, the economic sustainability of the IM is not yet ensured. The IA leaders have created a governance structure that binds the new Forest Owners Association and the local Consortium Segre-Rialb, for the latter to provide administrative support to the association. Besides, during the first year at least, the CPF takes part in the structure to contribute to three tasks: the production of the PROMACC, the search of

investors and the certification of the forestry measures conducted in the area. After 2022, the economic sustainability of the fund will rest on the ability of the forest owners association to ensure enough income to contract a third party to carried these three tasks in the long term.

Conclusions: impact and future perspectives

In conclusion, despite the impacts of the Covid crisis on the implementation process, the IA Catalonia saw through the successful recognition of FES oriented multifunctional forest management in the new Urbanistic Masterplan, the design of a Forest and Water Fund integrated into a broad territorial vision and the creation of a forest owners association and a governance structure for the fund. The foreseen extension of forest management in the IA area is expected to positively impact both water quantity (by reducing water consumption by trees) and water quality (by reducing the risk of losing forest cover) along with other FES (landscape, biodiversity, timber, …). Nevertheless, the cost-efficiency of the designed fund remains to be assessed in the long term, during and after the first trial year, during which the CPF will still play an important part. Much of the responsibility in terms of securing funding and governing the fund will be in the hands of the Forest Owners Association after 2020. As the IA leaders mentioned, there might be some options to explore in the meantime, such as securing a minimal yearly budget or some seed money to support the first years of implementation.

Overall, the IA developed in Catalonia by the CPF sets up a rich example of co-creation and integration within a broad territorial vision. The IA process was highly participative, particularly the first MAG meeting, which gathered a large diversity of stakeholders across sectors and scales. The local network built by CPF before the IA implementation and during and between the MAG meetings allowed to create synergies with other initiatives, to seize opportunities (such as the concomitant process of the PDU) and to lean on existing local governance structures, such as the Consortium Segre-Rialb which proved to be a key partner in the development of the IMs. The quality of the process and the integration of the IM in the territorial planning strategy might enhance the success potential and sustainability over time.

On a larger scale, the IA leaders expect that the approval of the PDU will significantly facilitate the investment of public funding in local forestry and lead to the development of financing instruments to support the provision of FES. Moreover, Catalonia counts more than fifty water reservoirs whose PDU has to be periodically revised, which could follow the example of the PDU for the Rialb water reservoir. The IA led by the CPF might thus have set an example that will have impacts on a larger scale in the long term.

5. Congruence with policy frameworks

Forests provide multiple ES, for which the societal demand is increasing. On the European level, there is an ongoing scientific and political debate on whether current governance and policy mechanisms provide adequate support for the provision of these services or not. This chapter, building on the Policy Demand Report (D3.2), aims to address this question, recognizing the complexity and the need for improved coordination between forest-focused and forest-related policies. Data for this chapter comes from: i) the ex-ante SSA and subsequent interviews that were conducted with the IA leads in 2018, ii) a European scale survey conducted with forest owners and managers in 2019 (ca. 1800 participants), iii) the ex-post SSA and subsequent interviews with IA leads, conducted in 2021, and iv) a synthesis workshop conducted in June 2021. Importantly, this chapter synthesizes some of the project's findings, several of them previously presented in other deliverables, to reflect on the relation between IA implementation and the policy framework.

Figure 19 depicts the enabling and hindering factors as indicated by 1149 European landowners and managers during the Europe-wide survey conducted in 2019. 'Policy makers and stakeholders' as well as 'Regulatory framework (laws and rules)' are listed as strongly impeding factors for FES related

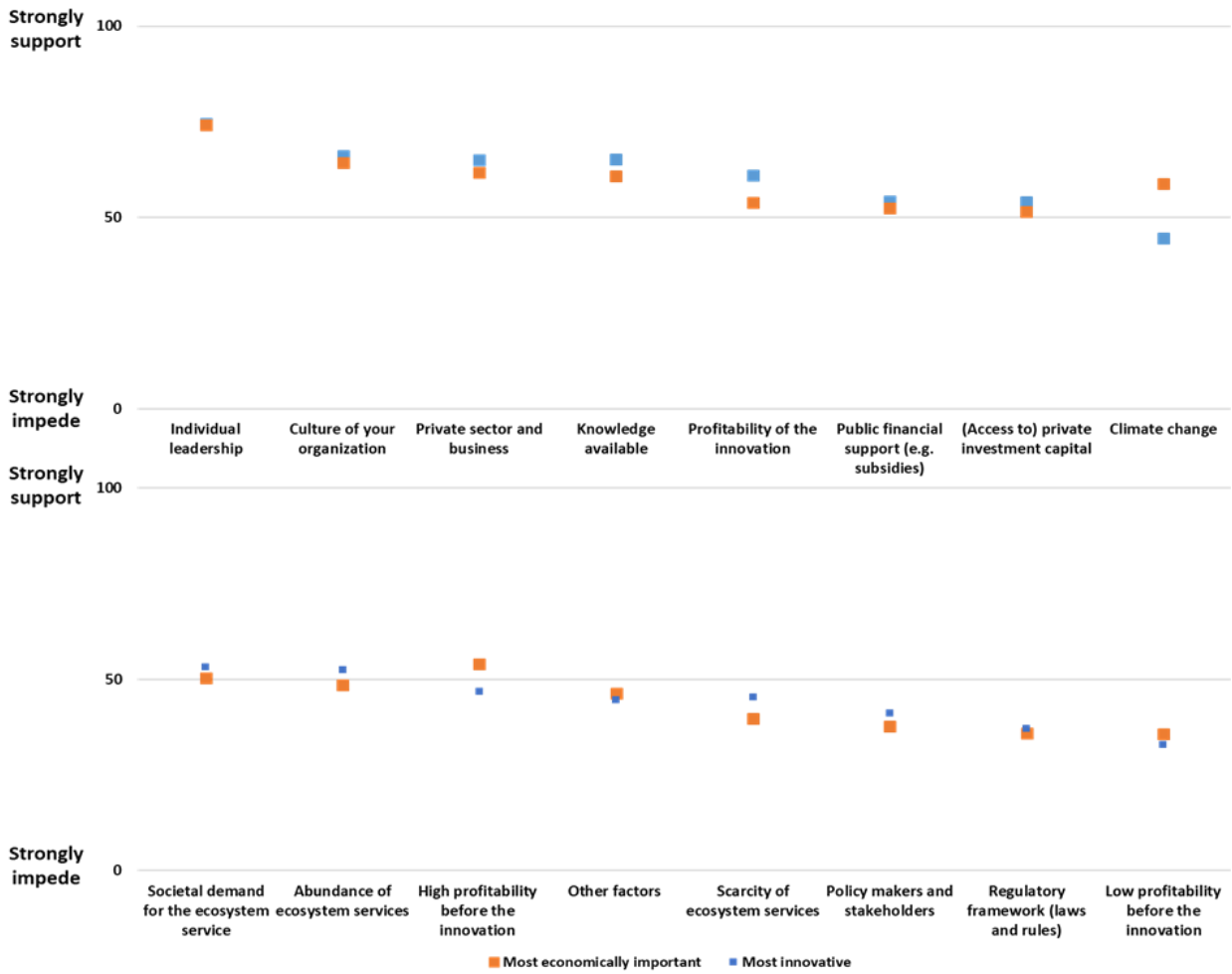

Figure 19 Enabling and hindering factors on development of most economic and relevant innovations in European forests (Source: D1.3)

innovations. This indicates the importance and possibly hindering the function of policies and policy stakeholders, but possibly also the importance of involving stakeholders in the innovation process.

Based on the initial ex-ante self-assessment (see section 4.2 and Deliverable 3.1) and subsequent interviews with IA leads conducted in 2018, the visualization in Figure 21 was developed. To develop this Figure, first, all the data per individual case study was compiled. Secondly, prominent data groups that were used to describe the development of case studies were identified. All the collected data was then re-arranged according to these data groups, separately for each case study. The final stage of data synthetizing included listing of the most important factors describing the case studies, where presence or absence of the respective factor was assigned for all case studies. The identified factors include:

Policy Factors

- Support from core sectoral policy
- Problems with national policy coordination
- Lack of compatibility with state-aid rules
- Need for EU-level strategic policy support

Other Factors

- Clash between stakeholders
- High interest of stakeholders
- Radically new innovation
- Capital intensive innovation
- Strong leadership
- Culture of innovations
- History of development
- High ambition

Next, a matrix was designed where the columns represent the listed factors, the rows list the case study areas and the entries in the matrix are presence or absence of the respective factor in the particular case study. This matrix was then subjected to multiple correspondence analysis (Greenacre, 1984), a method for visualizing the rows and columns of a table where entries are categorical data – analogous to the principal component analysis (Abdi and Williams, 2010) for continuous data.

On the right side of Figure 20, a clear grouping of three IAs can be seen: the Swiss and the two Italian IAs appear here. The Switzerland IA focuses on funeral forests; i.e., a forest management regime tailored for the function of a natural burial site, which represents an income to the forest owner. The Italy/Borgo IA focuses on creating a mobile application (app) for mushroom picking permits. The idea is that a part of the income generated through the permits feeds back into forest management to adapt it more for the provisioning of mushrooms, while the secondary target is that the payment mechanism creates some control of the geographical distribution of pickers so that the local association can take active measures to avoid their concentration in specific areas. The Italy/Etifor IA is a public-private partnership for sustainable

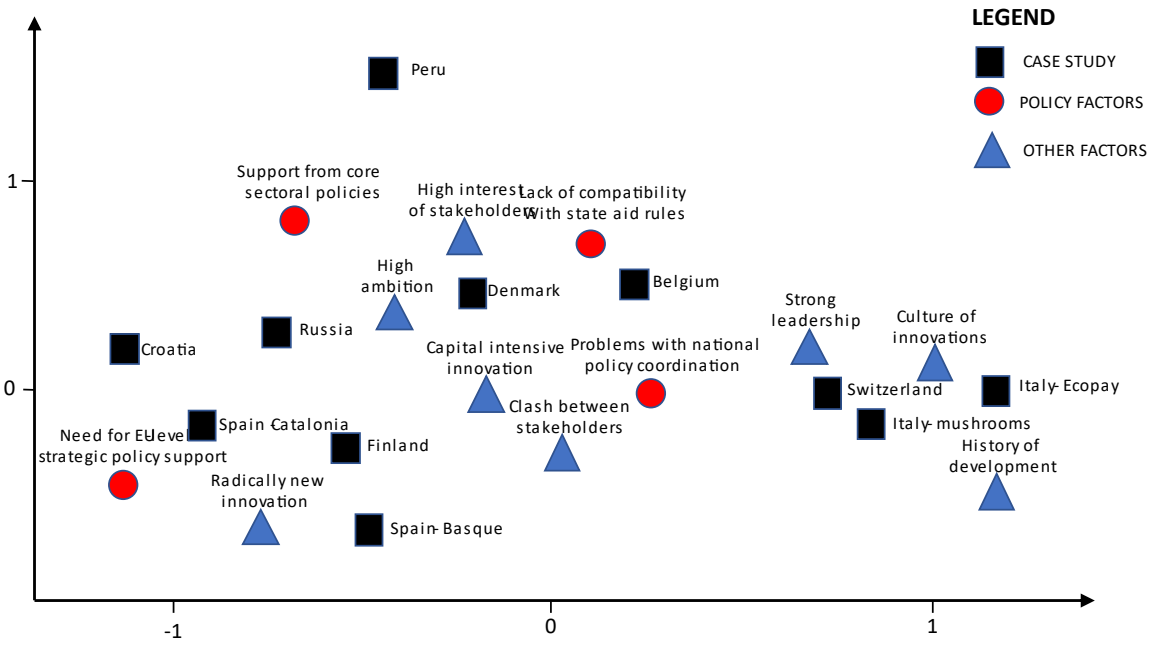

Figure 20 Multiple-correspondence analysis of main factors behind innovative mechanism (From Deliverable 3.2)

forest management and biodiversity restoration, where the IA team helps owners of poplar plantations to obtain FSC certification (conditioned by implementing forest management measures for habitat restoration, which the IA team provides information on). The unifying features of these three cases are that they exhibit strong leadership by their IA leads and that their organizations have a **strong culture of supporting innovations**. They are also small, commercially oriented organizations. Their studied innovations are of incremental character and have been in **development already** before the SINCERE project began. Relative to innovations in other cases, the area in which they are developed is more local, with clear boundaries and developed marketing characteristics and clear institutional settings in the two Italian IAs. In the Switzerland IA, however, policy factors are seen as having a strong influence. Specifically, for the funeral forest business model to be successful, the institutional setting is critical: in case institutions interdict using forests as a funeral place, the business innovation cannot function. If reversely, there is total freedom in where the ashes of the deceased may be deposited, the business model may also be hampered by lacking exclusiveness of the service. In Switzerland legislation differs greatly at the level of cantons, constraining partially the option to spread the innovation model for cultural/spiritual ecosystem services into other regions of the country.

The second group consists of the Belgium/Flanders, Denmark and Peru IAs. For the Belgium/Flanders IA, the public agency needs alternatives to the existing subsidy system in order to enhance biodiversity conservation. The IA uses reverse auction as IM, where the suppliers (forest owners & managers) bid to sell the forest ecosystem services, and the government buys them. The IA focuses firstly on restoration of hunting areas and on biodiversity conservation in rare habitats, while the secondary target is to establish wild boar strips between agricultural patches to limit the negative impact of the species and to promote biodiversity. The Danish IA is also based on a reverse auction system targeted at private forests, whose owners and managers bid to sell biodiversity conservation measures to the public agencies. The Peru IA focuses on a payment scheme for water and soil regulation services provided through management of the watershed (reforestation, infiltration trenches, agroforestry), which also represents income for the local

communities. These IAs share the communality that they are highly ambitious, **capital intensive innovations** with strong replication and upscaling potential. They are characterized by a **high level of interest among stakeholders**, many of which have **divergent standpoints** on how to proceed. In the Denmark IA, for example, the aim of the IA-lead (governmental organization) is to win the bids on selling complete harvesting rights, thus creating 'untouched forests'. This is perceived as a drastic measure by some of the forest owners, who are reluctant to entirely sell these rights. Thus, after more dialogue between the involved actors an alternative strategy was investigated where forest owners may bid individual biodiversity conservation measures and not the whole 'package' of forest management rights. The Peru IA is characterized by a conflict between the local communities and the municipal water utility, where the development of the payment vehicle is marred with uncertainties in relation to how the benefits of the mechanism will truly reach its suppliers and on the control of the provision of the services stemming from the payment mechanism. Both the Denmark and the Belgium/Flanders IAs have problems with **compatibility to the state aid rules** as these are new types of payment mechanisms ate national level, for which there is lack of full compatibility with the national legislation. The Peru IA does not face this obstacle, as recent law has enabled municipal water supply utilities to reward hydrological ecosystem services from upstream watersheds, which thus makes it an outlier of the group.

A third and somewhat less cohesive group of cases is located at the bottom-left of Figure 21, which entails the Russia, Finland, Croatia, Spain/Basque Country and Spain/Catalonia IAs. The Russia IA focuses on a regulatory mechanism allowing for the economic use of rented forested land for its multiple purposes, which should increase economic efficiency and aim to maintain a balance between all ecosystem services. The case also intends to include the concept of ES in the national Forest Code. The Finland IA aims to develop an operational platform comprised of local stakeholders where the landscape and touristic services of the forests will be jointly planned and optimized. The IA also intends to establish a voluntary payment scheme for these services that would be paid by tourists, the proceeds of which would then provide an additional income to the forest owners. The Spain/Basque country IA aims to develop a local regulatory framework to place the economic values of services provided by the forests as an integral part of the Basque region forest management strategy. The rational is to provide a basis upon which future PES can be designed for the supply and enhancement of FES. The Spain/Catalonia IA aims to develop a legal document for the establishment of a Rialb Reservoir 'Forest for Water' Fund (to be funded by rural tourism and other local business), which would then in the future fund FES payment schemes. The Croatia IA focuses on valorisation of the health and recreational function of the nature park Medvednica by i) raising public awareness on these functions provided by the local area, ii) participatively designing management activities for increasing their supply, and iii) setting up a system to fund these activities through concessions for one-off events and a voluntary payment system. Although these IAs are quite diverse, they all affect how forests are managed and are predominantly linked to (local) policy change. Out of this group, the Russia IA is **highly ambitious** and the only SINCERE case that in the end will operate on a national level. The Finland IA is capital intensive as it will have a payment component, and Spain/Basque country IA is characterized by strong clashes between stakeholders (forest owners on the one side are fearful that future payment schemes that are conditional on certain management practices will restrict their owner rights too much compared to a subsidy system, whereas the environmental groups backed by environmental legislation argue that it will not sufficiently secure the provision of all the forest ecosystem services). However, to succeed, they all require **top-level administration strategic policy support**. For EU-based IAs this refers to support from EU legislation and institutions and national governments, and for Russia, it refers to support from the top-level state administration. To succeed, all the cases in this group require the meaningful

participation of (local) stakeholders. Top-level administration's support in form of recognizing FES in relevant strategies or equivalent documents, or similar policy commitment showing the importance of FES as a concept would be enough to tip the balance of the negotiation processes with local stakeholders towards an implementable path. The Croatia IA is somewhat of an outlier of this group as its diverging feature is that top-level (national support) for the valorisation of FES already exists.

The majority of IAs in the second and the third group furthermore enjoys the **support of core sectoral policies**, which cannot be stated for the Swiss and the two Italian cases (first group). This is because the IAs in group 1 are more commercially oriented than other cases and thus have more of a local character.

From our analysis of the initial ex-ante self-assessment and subsequent interviews with IA leads, conducted in 2018, and the ex-post self-assessment and subsequent interviews with IA leads, conducted in 2021, it can be said that all IAs conform with the policy frameworks in place, at national and EU-Level (where applicable). In some cases, policy coordination needs to be improved addressing the trade-offs between different policies, but also aligning policies of different governance levels and institutions. It is clear that there is furthermore a need for more supportive policies, although there is not a 'one size fits all' solution. Although 'Knowledge available' was listed as a supporting factor in the 2019 survey (see Figure 20), during the interviews conducted with IAs in 2021, the need for improved knowledge and information sharing systems was clear. The different support needs can be summarised into three main groups, which are analysed in the sections that follow (5.1-5.3):

1. Administrative and policy support, including a PES scheme
2. Better aligned and enabling policies ('less red tape')
3. Improved information systems and platform

5.1 Administrative and policy support, including a PES scheme

There is a need for top-level administration and strategic policy support. For EU-based cases, this refers to support from EU legislation and institutions as well as from national governments (Finland and Belgium/Flanders IAs), and for the Russian IA, this refers to support from the top-level state administration. Specifically, top-level administration's support in form of recognizing FES in relevant strategies or equivalent documents, or similar policy commitment showing the importance of FES as a concept is needed in the case of the Russian IA. Within the EU cases, there is an expectation that if the EU would address this issue within their policies, it will trickle down to the national and sub-national level. The Croatian IA might serve as an example of how policies might support FES, as a new national law has recently been adopted which endorses and governs a permit system for the use of FES. It is however to soon to evaluate the effect of this legislation, although it is anticipated that this law will support the case in its quest to convince society of the necessity of such permits.

A public funding (incentive PES) system is here and in other cases seen as necessary for supporting the successful provision of FES. Such payments should be based on the condition of additionality, at least improved management practices. It is also seen as beneficial in the case where market-based initiatives are being launched. In such a case the PES payments would not be continued for an unlimited time, but rather help to establish the initiative and assist to cover initial expenses. Within the EU, regional differences are

highlighted and important, and this leads to a discussion in how far a PES system can be designed at the EU level in relation to national and regional levels. One suggestion is that an EU-wide PES scheme would set a general framework, with regional and FES specific criteria that detail the conditions of payments and objectives to be achieved. Next to the necessity to adapt the payment system to regional differences, the valuation (in monetary terms) of certain FES is seen as problematic. It is suggested to implement a large-scale valuation and monitoring (evaluation) system accompanying the establishment of the PES system.

5.2 Better aligned and enabling policies ('less red tape')

Many IAs experienced compatibility issues of PES or market-based schemes with state-aid and taxation laws (Switzerland IA, Belgium/Flanders IA, Finland IA and Italy/BorgoIA as specific examples). Concrete examples include public organisations being prohibited to run a market-based FES scheme as income tax laws are applicable to the income generated through the FES scheme. There is a need to better align policies to support such innovations, and there is also a need to reduce trade-offs between sectoral policies, but also different levels of governance (Switzerland IA and Italy/Borgo IA where complex political relationships exist between different governance levels). Arguably, the institutional framework sets the conditions for the development of FES related market-based schemes and business development, both enabling and constraining their development. Careful reviews of the institutional setting in the light of the further development of such approaches are needed and should be done as a collective effort, involving a broad set of stakeholders to establish cross-sectoral consensus.

5.3 Improved information systems and platforms

There is an impression by practitioners that there is a lack of awareness of the full potential of FES especially at higher policy levels as well as amongst society. There is thus a need to better inform these groups about the value and benefits of FES. In this regard, it is important to be aware of political and power differences amongst involved actors that arguably cannot be altered much. Yet, better information, e.g., through an information-sharing platform where the services providers could learn from other cases about the best practices and full potential they could reach with their FES innovations, is seen as beneficial. Such an information-sharing platform could support service providers raise awareness amongst society of the importance of FES and the need to incentives the provisioning of FES, in some cases through market-based initiatives (Croatia IA, Russia IA, Finland IA and Italy/Borgo IA). Ideally, such a platform should be established at the national or supra-national (EU) policy level, but the information should be fed through a bottom-up approach (directly from the ground level practitioners). There is a substantial expectation that increasing the importance of the issue at EU or national (top-level), policymakers would constitute more attention on the issue at lower governance levels, increasing engagement. Table 3 indicates the main policy support needs of each IA as voiced during the interviews.

Table 4 Typology of IAs and policy support need

Administrative and policy support, including a PES scheme	Better aligned and enabling policies ('less red tape')	Improved information systems and platforms
Denmark		Denmark
Finland		Finland

Peru		Peru
Croatia		Croatia
Belgium/Flanders	Belgium/Flanders	
Spain/Basque country	Spain/Basque country	
Russia	Russia	
Italy/Etifor		
	Italy/Borgo	Italy/Borgo
	Switzerland	

When the IA case-studies are broken-down into their characteristics and policy factors that affect them, a tripartite grouping of policy support mechanisms emerges as depicted in Figure 21:

- **PES schemes** – ambitious, capital-intensive innovations characterized by high interest of stakeholders with diverging opinions. As these innovations aim to introduce actual changes in how land and forests are managed, their implementation is conditioned with compatibility between the PES scheme on one side and with the legislation that governs that area on the other. One challenge is the compatibility between the PES scheme and the state-aid rules, without which its implementation cannot start. For instance, the state is not allowed to pay forest owners more than what compensates their losses through restrictions in use rights of their forests, which implies complicated valuation studies to evaluate the value of FES provisions and additional efforts of land managers. Furthermore, the distributing agency must have a legal basis to enter into contracts for payments that differ from the state aid rules, and the distributing agency has to define what their implications are to EU-level subsidy/support, in comparison to state aid.
- **Market-oriented innovations** – these are innovations more of a local character, with a clear market strategy and governed by individuals with a strong drive to succeed and by organizations with a strong culture of supporting innovations. These innovations are also incremental and build upon rich previous experiences, and their implementation is closer than of any other group. The more prominent policy problems that these innovations face are typical market barriers, e.g., through unfavourable taxation systems. However, these commercial activities may change local management practices, which can lead to problems with national policy coordination, similar to the previous group of innovative mechanisms.

- **Voluntary and legislative innovations** – these innovations are spearheaded by state-affiliated organizations, be it local area management agencies, local administration or scientific organizations. They are not capital intensive, but in order to be implemented need strong political and strategic support, be it at the national or EU-level.

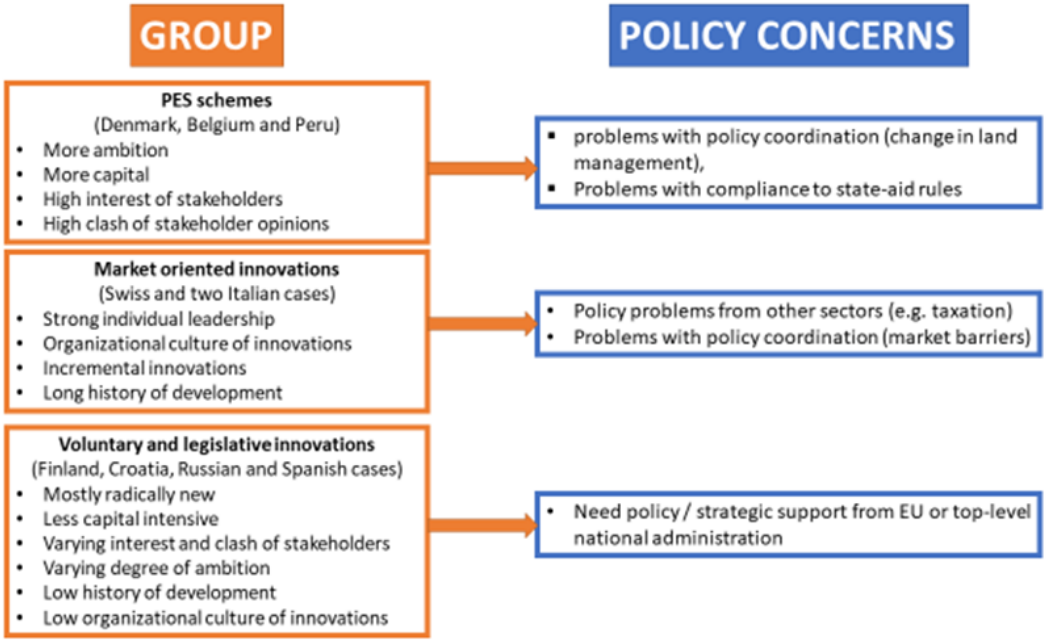

Figure 21 Typology of IAs and their polcy concerns

The institutional and policy fit of FES innovations depends, in the end, strongly on their main design and focus. Based on inventories of FES-focused innovations across Europe (Deliverable 1.2), it can be seen that such innovations are initiated equally by private and public organizations, that they usually operate either on the local or regional level, that they frequently combine different land-uses (e.g., forests and agricultural land), usually occur in a rural setting, are usually focused on productive ecosystem services (i.e., wood and non-wood forest products), and the implementation of a new mechanism for an already existing FES. The large-scale survey with forest owners and manager (Deliverable 1.3) supports the finding that most of the existing innovations focus on wood and non-wood forest products. More specifically, the three most frequent types of FES-related innovations in Europe reported by the survey are i) 'Change of forest management to improve/sustain biomass production' (21%), ii) 'New technology for biomass production" (14%) and iii) 'Change of forest management to provide other ecosystem services' (12%). The economically most important types of innovation in the perception of forest owners and managers are 'New technology for biomass production' (21%) and 'Change of forest management to improve/sustain biomass production' (19%), while the 'most innovative' innovations are 'New technology for biomass production' (17%) and innovations that tackle 'New ecosystem services' (15%). Finally, the majority of all developed innovations are improvements of previously existing ones, while only about fifteen per cent are new ones. This underlines the necessity for policy to support diversification of innovations focusing also on regulating and cultural ES. It is recommended that this type of support targets bundles of ecosystem services, as the data (Deliverable 1.3) shows that the supply and demand of many regulating and cultural ES are quite correlated. A separate survey aimed at members of the European Landowners' Organization shows that the provision

of the vast majority of CES goes hand-in-hand (the main exception is hunting; Deliverable 1.3). The data also shows the perception of a strong increase in societal demand for these ES amongst forest owners and managers, which can directly be linked to the increased sensitivity of European society to issues of climate change and biodiversity loss.

The above findings were confirmed during the Synthesis Workshop. It once more became evident that there is a strong need for a **flexible, enabling regulatory and policy framework** which establishes a clear and supportive framework for multiple FES provision, acknowledging the trade-offs and provide mechanisms to reconcile them. More flexible legislation is needed to allow and support the development of a large variety of initiatives adapted to the local contexts and to allow for the collection of payments in this regard. The need for **financial resources (support)** was also reaffirmed, to develop mechanisms such as those tested in SINCERE. Public (EU) funding is needed, at least in the initial ("experimental") phases of innovations. The policy framework should make provisioning for such funding. A balance should be obtained between the necessary agility/flexibility of such a policy framework and the need for public control over the use of public funds (an important political-ethical issue but which creates bureaucracy, delays, obstacles). Furthermore, the policy framework should also include an **inventory/knowledge platform** on the most important FES and FES-related issues. For some FES-related issues (e.g., regarding climate change, biodiversity loss), such an inventory/knowledge platform might have to be done at a national level. In this regard, practitioners need to share their best practices, which has to be communicated and disseminated on a broader level. The **policy and regulatory level** at which each of these dimensions should be tackled (EU, supra-national, national, or local) remains a key question. It is crucial for the success and continuity of FES innovations to involve local stakeholders (forest managers and practitioners), as it improves trust building. Nonetheless, it has also to resonate at policy level. Thus, a bottom-up approach is important especially for the supply side, while the top-down approach is important to secure the funding or to enable it. In this regard, the necessity for **policy integration** at the EU level and at the national scale was also reiterated, as supporting the provision of FES is a cross-sectoral issue. A European level common ground is needed at policy-regulatory level, and its transposition at national/regional level is key to ensure operationality. This could be achieved through bi-directional policy integration:

1) a forest strategy/main framework would bring a holistic perspective on forests and lay the grounds for innovative schemes such a payment for FES.
2) Existing EU directives or policies related to FES (e.g., the Water Directive, CAP, Biodiversity Strategy) would integrate more specific regulations for related innovative schemes

Conclusions

This Deliverable (D3.4) as an updated and further developed version of D3.3 is a joint synthesis document of research and practice partners featuring the main results from the IAs in terms of performance, sustainability and congruence with policy frameworks and elaborating with in-depth assessments and testimonies with lessons-learnt. In this sense, this Deliverable has been developed in line with the DoA and addressing Task 3.1 (end-of-project status to further the IA), Task 3.2 (self-Assessment Reports are analysed, compared amongst each other, and synthesised in lessons learnt), and Task 3.3 (contributing to the Synthesis of Implementation with a focus on policy framework). In this section, we enhance the preliminary conclusions drawn in D3.3 according to the updates introduced in this Deliverable and with particular reference to the SINCERE Impact Indicators (Pathway I: Enhance the sustainable provision of FES through locally adapted/adaptable innovative mechanisms). The conclusions are organized per Task and are synthesised in the end together with insights from the Synthesis Event Learning (June 2021) and with emphasis on post-SINCERE perspectives. The key conclusions will be further used in WP4 to synthesize experiences across IAs, setting the findings of the SINCERE project into a wider perspective, derive models for upscaling and formulate policy recommendations for future IAs.

Implementation and performance of IAs (Task 3.1)

All ten IAs were launched as documented in the submitted implementation plans, pre-feasibility assessment and sustainability assessments, and in addition we note that the IA in Belgium essentially implemented two different IMs. Thus, a total of 13 IMs were successfully launched across the SINCERE project's eleventen IAs (Impact indicator I1.1).

The IAs differed in major ways from each other in both the targeted IM, the regulatory framework conditions they face, and thus in gain versus risk profile. Most of the IAs are well into the mature phase of implementation, where actual action on the ground is taking place. This includes the Belgian and the Danish reverse auctions on habitats and biodiversity, the Italian cases on biodiversity off-set and certification and improved market management for mushrooms, the Swiss case on burial sites, the Peruvian and Catalan watershed cases and the Finnish recreational case. A few of the IAs, pushing for policy changes, are in a process of change, which includes e.g., the Russian and the Basque cases that target changes in policy and regulation to enhance FES management options have only reached the development phase of implementation.

Visible changes of FES can in many cases be a long-term process, e.g., when targeting biodiversity protection and watershed services. For IAs with this kind of focus, performance cannot be measured at this stage of implementation in terms of the actual effect on ES provision. However, the IAs with this type of focus have already succeeded in establishing contractually binding improved conditions for future FES provision on almost 300 hectares of land, affecting provisioning, cultural, regulating and supporting FES. We expect to see these performance measures to pick up over time and post-project. Other IAs have succeeded in the short term in proof-of-concept impacts in terms of e.g., payment for recreational group activities in Croatia and forest funeral sites in Switzerland.

At this stage of the change inducing process started in the IA, process indicators like stakeholder engagement and input to the IAs are also important to gauge the likely potential of the IAs and the legacy of the SINCERE project going forward. Again, we see variation across IA cases, reflecting difference in collaborative traditions, regulatory frameworks and the group of relevant stakeholders. Overall, the IAs have

seen a lot of interest and positive engagement from many different stakeholders who have followed the implementation processes along the way and provided valuable advice and shared their experiences. This has improved the co-creating processes in the different IAs.

Sustainability self-assessment process and findings (Task 3.2)

In terms of sustainability goals, most of the IMs target a combination of ecological, economic, institutional and societal aspects addressing in this way all the four dimensions of sustainability. Most of the IAs have reported to have reached a generally positive overall sustainability and the results of the self-assessment seem to match the main sustainability targets and expectations of the IAs at this stage despite the often-uneven performance to the different dimensions (Impact indicator I1.2). Most of the IAs report economic and/or managerial aspects as their weakest point in terms of sustainability, while referring to issues such as increase in transaction costs, coordination, preparation, marketing, and lack of mid- to long-term financial security. The strongest points in terms of sustainability across IAs are more diversified: they refer mainly to the IMs' ecological contribution (e.g., improvement of the ecosystem structure and biodiversity) but also to social participation and awareness, and less to economic sustainability. Nevertheless, all the IAs have well-defined future actions to address their IMs' sustainability shortcomings and seem to dynamically plan their long-term impact. The sustainability self-assessment reports are all very rich in data, but also diverse in terms of the level of development, the depth of analysis and details in the responses provided. Although using the same framework, some IA leaders have been more self-critical than others. Results cannot be compared across cases, the self-assessment process itself has always been the focus. If further analysis will be beneficial for finetuning the SSA protocol and tool and draw lessons from SINCERE experience, we deem the SSA overall successful, considering the completion of the process, the results and the partners' feedback.

The SSA was approached as a transdisciplinary exercise that involved all SINCERE research and practice partners. The process itself was considered very important in creating opportunities for collective reflection on sustainability within an action-research setting. Indeed, if sustainable forest management has been extensively studied and multiple standards for sustainable forest management exist, the introduction of the ES approach and the advancement of MBI and PES in forest governance presents new challenges that we have aimed to address in our approach. The ES approach presents some common ground with the sustainable forest management approach: both recognize the need for a holistic view favouring synergies, reducing negative trade-offs and encouraging a balanced delivery of private and public benefits. The ES approach, however, has a stronger focus on valuation. The ES concept is descriptive and normative, and it frames human-nature relations in a specific way, e.g., in terms of demand and supply of ES. As such, the concept of ES inevitably involves judgements about what we value in nature and forests and how, which enhance the need for a collective discussion on these questions. The same logic applies to the innovative mechanisms that are the focus of SINCERE. The eleven IAs reflect the diversity in forms that PES schemes, understood simply as the 'principle of paying for the provision of an ecosystem service', can take in practice. The core features of these mechanisms imply a reflection on 'what is paid for' and thus valued by the stakeholders, a reflection which should be done with and by these stakeholders to ensure that the mechanisms' design fits the local specificities. Beyond mere concerns of social acceptance or accountability, our sustainability self-assessment approach aimed at triggering a reflexive process with and by the local IA leaders and encouraging critical assessments of the processes that they have developed. Our experience confirms that realizing the potential and opportunities of the "science–policy–society" partnerships,

increasingly recognized as necessary for a sustainability transition, requires the development of a common language, transparency, and considerable time commitment. It is thus important that future action-research projects such as SINCERE provide enough time for such endeavour and enough flexibility for co-created fine-tuning along the way.

Congruence with policy frameworks (Task 3.3)

Policies and regulatory frameworks set the essential framework for all FES innovations. They simultaneously enable and constrain FES innovations. A participatory assessment of the institutional landscape seems necessary, at the level of the region or state, to clarify how institutions constrain innovations. For such an assessment process, all relevant stakeholder groups need to be considered to ensure that a diversity of viewpoints and interests is considered.

At the higher (national and EU) policy levels, forest-related policies should be guided by the main target to align ES provision and societal demands. An intelligent policy mix is needed to support forest owners and managers in harmonizing their management to societal demand and exploit synergies between FES services.

The potential of Europe's forests for FES provision differs, as do societal demands and the motivations and objectives of forest owners and managers. For a policy supporting FES innovations, this means that no 'one-fits-all' solution exists. Nevertheless, at the EU level, a general 'normative framework' needs to be developed which provides the necessary flexibility to address regional diversity and distinctive FES. The Framework should clearly establish the idea that forests need to provide multiple ES (more explicitly integrate FES), ensure through regulations that European social and ecological 'boundaries' are set (e.g., strict protection of remaining primary and old-growth forests), and at the same time foresee the main architecture and resources to support/co-fund a European PES system for forest owners, to be further specified at national and sub-national levels. The time is right for such an approach, and Europe is lagging behind other world regions and even supports such systems in tropical countries.

Knowledge exchange across country borders and sectors is critical to advance the development of FES innovations. Policies should support such exchange and learning through establishing a 'Learning Archictecture' for FES provision at the European level; this includes the supporting role of research to improve information on FES provision and demand and on FES innovation development.

Synthesis – General conclusions

Overall, despite variations in the level of implementation, or in the specificities of the mechanisms and the process, we can conclude that all IA's have successfully developed innovative mechanisms that are tailored to the local specificities through the involvement of a large range of local stakeholders. Many of our conclusions were reinforced and detailed at the Synthesis Event organized by SINCERE in June 2021, as we will discuss in this final section.

Among the learning points identified by the IA leaders and discussed during the Synthesis Event, many are related to the introduction of a FES approach in forest governance, management or policy, especially in countries or regions where this approach had not yet been integrated in all sectors. This approach seems to be timely relevant, in contexts that require a change, and a collaboration between policy

and science is needed to make it most beneficial. A FES approach is believed to introduce a new evidence-based natural resource planning. As demonstrated in this deliverable, the ecological impacts are difficult to assess at this stage, because measurable changes in FES and in forest ecosystems depend mostly on long term processes. However, most IM's have been designed on the basis of previous scientific research on forest ecosystems and include contractual conditions to ensure that the implemented measures have the positive impact intended in the long run. Further monitoring and research will thus be necessary to provide evidence of the long-term ecological impact of the IM's.

The novelty of the FES approach, and more importantly of the principle of 'paying for the provision of FES' has also proven to be a challenge for the IA's. As reflected in the status or in the scale of implementation of some IA's, introducing these ideas and convincing stakeholders to participate had sometimes required long processes of communication. Some IA's faced difficulties to collect payments/funding, and report difficulties in securing funding in the mid- to long-term. The focus on and success of local participative processes has been confirmed as a key aspect in these IA's development. More generally, across IAs, stakeholders and cross-sectoral cooperation is recognized as crucial to enable the implementation of successful IM, whether it is to understand and deliberate on diverging stakeholders' views and values, or to connect and create collaborative relationships between sectors. As we have highlighted in this deliverable, no 'one-fits-all' solution exists. A local focus is important. Successful schemes have to come from an adaptation to the diversity of local perspectives, a consideration of stakeholders' interests and needs, and a participative assessment of the institutional constraints and possibilities. Compatibility with the local institutional context is of course necessary for successful implementation but has however been an obstacle for some IA's who have faced legal barriers or cross-sectoral incoherence. As a sustainability transition implies going beyond business-as-usual, it is crucial to find a balance between conforming to the current institutional context and challenging the institutional and policy shortcomings, gaps or incoherences at the regional, national or EU-level.

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Appendix 1: IA Spain Catalonia response to the Sustainability Self-Assessment tool

Spain/Catalonia – Forests and water in Catalonia

Identity of the innovation action and mechanism

- Name of the innovation action:

Forests and water in Catalonia

- Name of the person(s) filling this document and role in the IA:

Teresa Baiges

- Brief description of the selected IM in its current state: name, location, objectives

The Catalan IA takes place in the province of Lleida, in the area surrounding the water reservoir of Rialb, the newest water reservoir in Catalonia, placed in the watershed of the Segre River, affluent to the Ebro. The study area comprises the 6 municipalities affected by the construction of the reservoir (Tiurana, La Baronia de Rialb, Ponts, Oliana, Bassella and Peramola) which conform the Consortium Segre-Rialb for the economic promotion of the area. After the brainstorming phase that took place in the 1st MAG meeting, 2 Innovation Mechanisms were selected to be implemented as pilot exercises in the area of the water reservoir of Rialb:

a) **IM-1: Inclusion of forests and forestry in a legal urbanistic planning instrument for the reservoir**: In the 1st MAG meeting, it was clearly highlighted that if an IM regarding PES on forests and water was to be implemented, we first needed to strengthen governance amongst the different sectors involved (water, forests, territory). Thus, participatory joint water-and-forest planning was identified as the previous step to take. The instrument we chose to frame this joint strategic planning was the "Urbanistic Masterplan of the water reservoir (PDU)" which production had been recently started for the Rialb reservoir (as it is the newest water reservoir in Catalonia), matching completely the lifespan of the SINCERE project (2018-2020). Process finished

b) **IM-2: Design of a local Forest Fund, on forests and water**: to explore and eventually design a real PES mechanism: A voluntary fund for forests and water. It involves the creation of a Forest

Owners Association, which has been already set, waiting for legal registration. Forest Adaptation and Mitigation Plan is being produced together with the FO involved, where the forestry treatments to be applied in the next 3 years will be planned. We have agreed to conduct a pilot trial for the first transactions of money with private (or public) investors in winter 2021-22, within the framework of the LIFE CLIMARK. In this other project they have defined the so called "Climate credits" with a methodology to evaluate the ecological and social value of the FES provided by the forestry treatments. Action In progress.

- What is the current stage of your IM? Design and preparation phase OR implementation phase? (NOTE: If you are in the implementation phase then you need to include all selected indicators in the excel sheet; if you are in the design or preparation stage, then you include general indicators and process indicators, and you exclude specific outcome indicators).

End of design phase – Beginning of Implementation phase

- What are your sustainability targets? Please cite here which are the 3 most important sustainability goals or principles for your innovation action.

- That its design is in accordance both with the needs of the local actors that will be responsible for its implementation and with the needs of the "market" that will have to feed it.
- Ecological consistency: the provision of the ecosystem services provided by the forestry works must be carefully calculated taken all sustainability aspects into account
- The IM should include a wide array of views, to prevent social, institutional or economical failures

- What do you consider as the strongest point of your IM in terms of sustainability?

- The methodology used to calculate the impacts of forestry on the ES is very robust (taken form project LIFE CLIMARK)
- The design of the IM has been very participatory and shaped to the needs that arised in every step.

- What do you consider as the weakest point of your IM in terms of sustainability?

- The long- term sustainability of the IM, once the CPF (or the SINCERE) input won't be there

Ecological dimension of sustainability

- Please describe the overall ecological impact of your IM in its current state:

Together with the FO Association we are creating an Adaptation and Mitigation Forestry Project Plan (PROMACC) where different forest treatments are planned to be implemented in the next 3 years in 20 hectares, for which we will search for private financing. For each of the treatments we have calculated its impact on Water provision (m3 of water to be sold) and also on Carbon balances and the biodiversity hosting capacity. Once these treatments will be implemented (winter 2021-2022) the resistance and resilience of the forest will be improved.

Principle 1: The IM shall preserve and/or enhance the ecosystem structure, including stand structure and biodiversity.

Criterion 1.1: The IM maintains or restores forest cover and standing stock of biomass (= zero deforestation and sustained level of living biomass).

Criterion 1.2: The IM maintains and protects biodiversity in its widest sense, including gene diversity, species diversity and landscape diversity.

Criterion 1.3: the IM maintains and enhances forest vitality, including increased resilience to drought, fire, storm, pests and diseases and other disturbances.

- Please describe and analyse here the performance of your IM in its current state of development, based on your assessment of the different criteria in Principle 1. Reflect as well on possible ways to improve your IM, based on this analysis.

The forestry works designed belong to the so called “Climate Smart Forestry” that includes both mitigation and adaptation measures. Specifically, they take into account fire resistance, soil conservation and increased tree vitality to face droughts (by reducing competition) The IM includes a requirement that all forestry works must meet biodiversity conservation criteria. Although we obtain products, so we reduce biomass stock, they are a subproduct of the forest restoration main objective. Plus, even though biomass stock is temporarily reduced, we expect to increase carbon sequestration rate by improving tree vitality. No improvements required

Principle 2: The IM shall preserve and/or improve the ecosystem functions.

Criterion 2.1: The IM preserves/enhances the ecosystem functions that are ensuring its long-term vitality and productivity, and its flow of ecosystem services, including closed biogeochemical cycles, continued carbon sequestration, erosion control, control over water fluxes, pollination, etc.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 2. Reflect as well on possible ways to improve your IM, based on this analysis.

The aim of the forestry treatments promoted is precisely to improve the ecosystem services most at danger in the Mediterranean: water provision, carbon sequestration, biodiversity

Principle 3: The IM shall have a holistic approach for its design, planning, implementation and monitoring phase, considering the appropriate spatial and temporal scales, and considering impacts inside and outside the area of focus, on short and long terms.

Criterion 3.1: The IM favours landscape approaches with a harmonious integration of different land uses (different forest types, agriculture, wetlands) in the provision of the targeted ES within the focal area.

Criterion 3.2: The IM also ensures ecological sustainability along the further value chain (e.g. carbon balance of the further product cascade).

Criterion 3.3: The IM should identify, keep a close eye, and report critical ecological indicators and thresholds.

Criterion 3.4: The IM should identify and avoid any potential negative environmental impact inside or outside the focal area, on short term or long term.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 3. Reflect as well on possible ways to improve your IM, based on this analysis.

The PROMACC being produced is a landscape scale plan so to be able to define forest treatments that go beyond the forest-site scale to achieve a higher impact where it is needed. The landscape approach is also useful to counterbalance ES trade-offs. In the carbon balances calculation we take into account the whole value chain. We plan to have a monitoring plan and we are still working to define the certification circuits.

- What lessons can be learnt from the integration of ecological sustainability concerns in your innovation action (challenges, opportunities, solutions that you have found, remaining doubts or questions, etc.)?

The fact that the aim of the project was to enhance ES provision made it easy to fullfill the requeriments involving ES. The Importance of the landscape scale to enhance impact and solve trade-offs between ES. Some remaining doubts concern whether we should also look for ethical criteria as regards as "greenwashing", for instance, whether we should accept money from a company that it is using huge amounts of groundwater to compensate its impact via the FUND or from a high CO2 emmitter company. Is that included in Criterion 3?

Social dimension of sustainability

- Please describe the overall social impact of the IM in its current state:

We have achieved to increase governance in the production of the Urbanistic Masterplan of the Reservoir, where FES were considered and where forest management was regarded as a key economic activity in the area to be promoted. 4 MAG meetings took place in which, for the first time in Catalonia, we sat in the same room people in charge of regional water planning, regional forest planning, local politicians, local and regional forest owners, local forest users' companies, and others to discuss on the link between forests and water and the role of forestry in tackling the water challenges the region is facing. We managed to reach a consensus on the positive role of forestry regarding water provision and fire prevention which, in turn, affects water quality. Together with the stakeholders directly involved in the IM we designed the "Forests for water Fund", an idea that came up in the fist MAG meeting. We are very satisfied with the social impact of the design phase of the IM at the local level and amongst the Catalan water and forest responsibles to raise awareness on the new topic water & forests. Not so much on society awareness. At local level, we have also created a new FO association which objectives and functions were set collectively with the FO. It is still to be seen how the implementation phase will demonstrate whether we have been able to provide sound social capital roots for the IM to walk alone, once the support from the SINCERE project finishes.

Principle 4: The IM shall be broadly accepted.

Criterion 4.1: Participation is ensured at all stages of the IM development process to strengthen its legitimacy and relevance. Priority setting and assessment of ecological, cultural, social and economic values are done in a participatory way, agreed with the stakeholders.

Criterion 4.2: The IM strives to meet a defined goal that is understandable and acknowledged by all stakeholders.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 4. Reflect as well on possible ways to improve your IM, based on this analysis.

We are very proud of the participation process we have carried out in the design of the IM. Maybe if something was to be improved, that would be to engage more conservationist NGOs, which only attended the 1st MAG meeting.

Principle 5: The IM shall contribute to improve community relationships and enhance social capital in the region.

Criterion 5.1: The IM development process enables and ensures the involvement of a diversity of actors and values.

Criterion 5.2: The IM includes mechanisms to ensure efficient, free and fair communication between stakeholders, taking into account the potential impacts of power relations within and between stakeholder groups on the deliberations as well as on access to them. The IM identifies, prevents and when necessary, addresses tensions or conflicts.

Criterion 5.3: The participatory process aims at fostering the emergence and sharing of common understanding and common values, and ensure a coherence between those values and the actions planned in the IM.

Criterion 5.4: The IM includes the recognition of each actor's role in forest and ES governance and strive for awareness and recognition of co-responsibility.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 5. Reflect as well on possible ways to improve your IM, based on this analysis.

We think we have achieved a good level of empathy and common understanding. Having external facilitators in the 1st MAG meeting resulted very useful to change power -relations and mindsets: we devoted one morning only to ice-breaking exercises and rol game activities. The participation of the project in the definition of the Urban masterplan of the reservoir was a very real and good exercise of how to increase governance in landscape planning. The co-responsibility feeling was clear in all meetings, and has led to other unexpected collaborations. Again, if one thing was to be improved was to put more energy in involving the conservation NGOs during the whole process, although we are not sure how would this have impacted in the final outcomes of the project.

Principle 6: The IM shall promote equitable solutions or alternatives, that trigger/stimulate new forms of coordination and a culture of negotiation including all relevant actors.

Criterion 6.1: The IM aims at realizing equity in access to the IM (e.g. between big and small forest owners).

Criterion 6.2: The IM aims at equity in access to the enhanced ES provision or quality, and maintains or enhances access to the other products/services the forest provides.

Criterion 6.3: The IM aims at equity in the distribution of (economic) benefits/income and costs. It aims at a balanced delivery of both public and private benefits.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 6. Reflect as well on possible ways to improve your IM, based on this analysis.

The IM involves the creation of a FO Association, with specific rules made by the FO Funders themselves precisely on that, avoiding inequity of access, and to allow small forest owners to participate without this implying extra costs for them. It is true, though, that if one person does not want to join the Association (which is voluntary) cannot access the FUND. The distribution of costs and benefits have been agreed by the funding members of the FO Association.

- What lessons can be learned from the integration of social sustainability concerns in your innovation action? (Challenges, opportunities, solutions that you have found, remaining doubts or questions, etc.)

The huge impact of having a well-designed participation project with clear objectives but, at the same time, high flexibility to adapt the roadmap to the outcomes of this participation. MAGs meetings' participant criteria and the facilitation services we used have been key, to achieve equity in the participation process. Challenges could be how to (or the need) to enrol the most polarised views in the process.

Economic dimension of sustainability

- Please describe the overall economic impact of the IM in its current state:

So far there has not been any real economic impact. We have provided our work to build the IM and the FO association, but the first money transactions to the area are not foreseen before the end of 2021. We have, though, created an instrument which hopefully, will be capable to diversify the sources of income for forest management and to attract private money to the forests and the ES they provide.

Principle 7: The IM shall be economically viable in the long-term

Criterion 7.1: The IM creates new sources of income for forest ES provision (quality and quantity).

Criterion 7.2: The IM is cost-efficient, economically viable and, when possible and relevant, profitable.

Criterion 7.3: The IM aims at synergies and avoids or reduces harmful trade-offs between the targeted ES and other ES. It aims at creating bundles of ES including those that are not easily quantified and monetized.

Criterion 7.4: IM contributes to the local economy and improves the conditions of local communities, by supporting local economy's development, diversification and resilience.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 7. Reflect as well on possible ways to improve your IM, based on this analysis.

All these 4 criteria here were the basic principles upon which we built the IM, particularly criterion 7.4: The need to improve and diversify the local economy to ensure that forests keep providing a wide set of ES. So, we have paid a lot of attention to fulfil these criteria. The idea of a bundle of ES has been adopted from that developed in the LIFE CLIMARK project where water, carbon and biodiversity are tackled, and quantified, at the same level, the 3 of them being regarded as key ES in the Mediterranean.

- What lessons can be learned from the integration of economic sustainability concerns in your innovation action? (challenges, opportunities, solutions that you have found, remaining doubts or questions, etc.)

Maybe the only week point would on the cost-efficiency which is still to be seen, the long-term analysis, and the fact the whole process, as in any PES scheme, depend on the voluntary will to

participate of both the promoters and, especially, the buyers. If we fail in engage the "buyers" the whole economic sustainability of the project cannot be attained. Maybe it would be interesting to have a backup solution, like initial "seed-money" from which to progressively develop the IM and also to secure a minimum yearly amount of money that allows for the FO Association to contract a third party to search for new investors, to produce new PROMACCS, to engage new FO, or to carry out the monitoring and the revision of the implementation.

Institutional dimension of sustainability

- Please describe the overall institutional impact of the IM in its current state:

We have managed to initiate a fruitful discussion between the Catalan water management responsible body and the Forest planning responsible body in Catalonia. We have based delimitated the work to the 6 municipalities affected by the construction of the reservoir, organised in a Consortium (Consortium Segre-Rialb), to boost synergies. The Consortium will be the local administration providing administrative support to the FO Association after the project lifespan. We have applied the methodologies developed in LIFE CLIMARK to the area tackled in SINCERE and have provided scientific background to claim for the benefits of forestry on water in that area. We have used the opportunity that appeared with the development of the Urban Masterplan of the Rialb Reservoir to implement a real governance planning exercise to promote forestry as FES provider in a legal document in the area.

Principle 8: The IM shall be designed and implemented through an integrative, inclusive and iterative process.

Criterion 8.1: The IM aims at cross-sectoral coherence, by embedding it in a broad territorial vision and plan, that matches local history and culture.

Criterion 8.2: The IM is based on an integrated assessment of all environmental, social and economic values. It builds upon a strong scientific basis that combines a set of appropriate methods and disciplines to obtain comprehensive and acceptable valuation results. It considers how decisions will accommodate incomplete valuations of ES.

Criterion 8.3: The IM includes a learning mechanism, which feeds the outcomes of this analysis back into the implementation process.

Criterion 8.4: The IM design and implementation process is characterized by inclusiveness. The IM achieves inclusion of stakeholders in knowledge production and IM design, to include hidden

social-ecological values, deal with power asymmetries and improve societal relevance of the valuation and the IM.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 8. Reflect as well on possible ways to improve your IM, based on this analysis.

As regard of the 2 first criteria, the performance is excellent as we have managed to engage the key institutional actors all along the project lifespan. We have been also successful in finding robust methodologies by networking with LIFE CLIMARK, especially for the environmental and economic indicators. Although we would have like to provide more robust local data on the link between forestry and water, we realised we could only rely in general biophysical models, that in the end seemed enough. As regard as the 2 last criteria, we are not so sure on whether after the SINCERE project we will be able to meet them. So far no learning mechanism have been put in place and, although inclusiveness has been achieved in the design phase, we have not yet foreseen the mechanism to ensure it in the implementation phase, beyond the fact that the FO Association is open, in its bylaws, to any FO willing to join it.

Principle 9: The IM shall deal with sustainability risks internally or through existing institutions.

Criterion 9.1. A dedicated governance platform/committee/representation is operational to review the process, manage sustainability risks or tensions, and address complaints from concerned stakeholders.

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 9. Reflect as well on possible ways to improve your IM, based on this analysis.

We have created an structure that links the new FO Association with the local Consortium Segre-RIALB (this latter will provide administrative support) and between the Consortium, the FO Association and the CPF, for the production of the PROMACC, the search of investors and the certification of the forestry works conducted in the area, at least the 1st year, as a pilot trial. But so far we have not set any long-term platform to review the process or reduce tensions. We base it all on the FO Association so far or, more so, to their ability to raise enough money to contract a third party to do this work for them in the long term. During the 1st year (2021-22)it will be us, the CPF, doing this job.

Principle 10: The IM shall align with democratically set priorities and legal frameworks.

Criterion 10.1: The IM complies with existing laws, and where relevant, with customary and traditional rights.

Criterion 10.2: The activities carried out through the IM are consistent with the rules and targets of the (public) funding which it uses (conditionality criteria are met). It aims as well at synergies with other public funding efforts mobilized in same the area and domain.

Criterion 10.3: The IM demonstrates added-value or an improvement beyond current practices and context and when necessary a discontinuation of "business-as-usual".

- Please describe and analyse here the actual "performance" of your IM based on your assessment of the different criteria in Principle 10. Reflect as well on possible ways to improve your IM, based on this analysis.

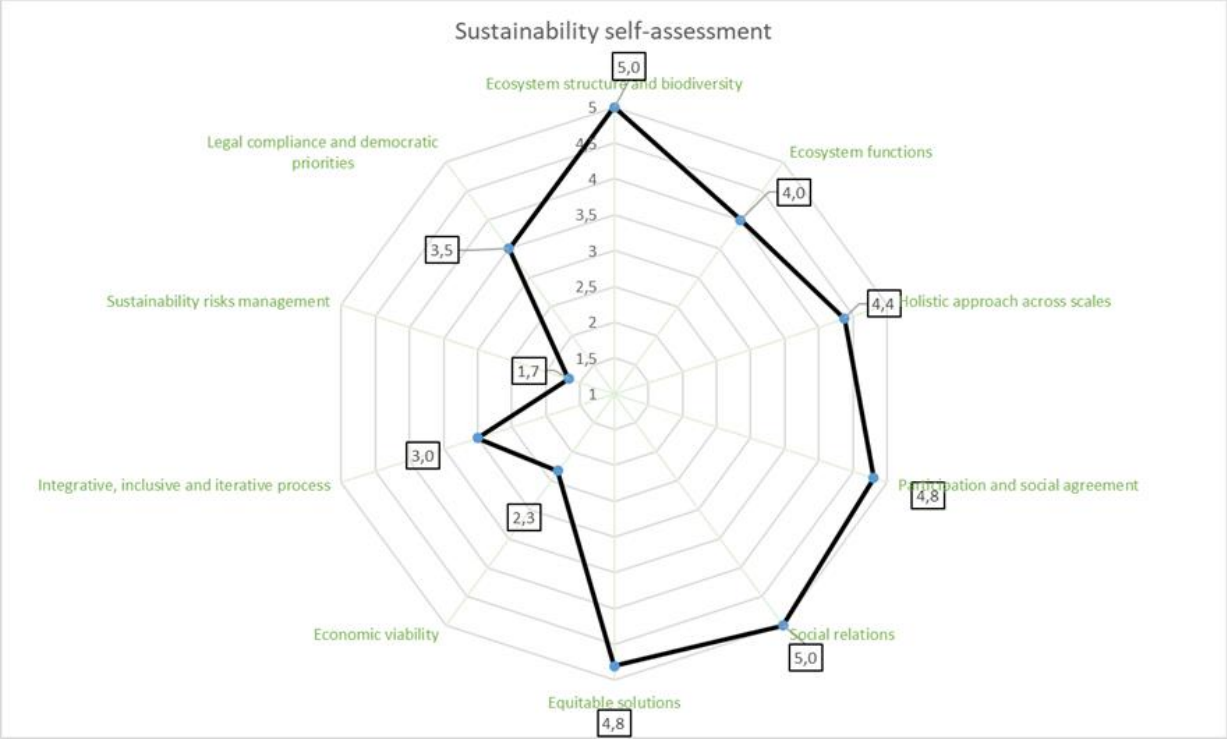
In this 1st year, we are conducting a pilot trial using the idea of the "CLimate Credits " foreseen in the LIFE CLIMARK, so we use their same set of criteria for the forestry works to meet to be financed by the FUND, regarding for instance biodiversity conservation, the need for a plan at landscape level or the need for a "decent salary" for the forestry workers. This goes beyond BAU. Of course the IM complies with existing laws as well. The IM has not closed the door to public finding so that other instititutions can use their already designed funding to invest in the Fund.

- What lessons can be learned from the integration of institutional sustainability concerns in your innovation action (challenges, opportunities, solutions that you have found, remaining doubts or questions, etc.)?

PES schemes have been proven, in our case, to be excellent tools (or excuses) to engage different institutions in a long-term discussion and participatory process, as they have a very well-defined outcome to provide, so it is not a discussion just for the sake of it but to build something together. This enhances the sense of co-ownership of the tool. The monitoring, the evaluation, the redefining of the IM is time and money consuming and in our case is difficult that the FO Association or the Consortium can carry out these tasks. We envisage that the PES scheme could provide enough resources for these tasks being subcontracted to a third party, but still haven't managed to secure this end.

Overall sustainability assessment

- Please copy-paste here the visual representation of your sustainability self-assessment, i.e. the spider web chart that is included in the last sheet of the Excel report.



- Please analyse the chart that you have pasted above representing your self-assessment visually. How do you qualify the overall sustainability reached by your IA? Are the different sustainability dimensions evenly performing? Why or why not?

We are happy with the performance of our IA in terms of sustainability, especially in its design phase. Looking at the chart I would have expected higher scores in the left side as well, but I guess this is due to the fact that the indicators we chose for these criteria are more related to the implementation phase. I think we chose indicators that could show the success of the IM (i.e. "amount of private money invested") more than its sustainability. Probably we should have put more effort in the identification of indicators, but as we did not realise its full usefulness yet, it was more like a SINCERE exercise more. Nonetheless, I think the chart succeeds in highlighting the main weak of our IM: that the sustainability risk management is not fully covered in our IM and that we have not managed to secure the long-term sustainability of the IM, beyond SINCERE.

- In conclusion, does the results of this sustainability assessment match the goals and expectations you had for your IM? Explain by referring to fulfilled and unfulfilled goals and expectations. Which unexpected results or impacts (positive or negative) resulted from the sustainability self-assessment?

Our goals and expectations were to design an IM that fulfilled all the sustainability criteria. So I guess the results of the assessment match the real state of our IM, but not fully our expectations.

- Based on your sustainability assessment and the potential improvements that you have reflected upon in the previous sections, how do you foresee the evolution of your IA?

We believe we still have room to improve the IM in the implementation phase and during the pilot trial. We expect that in 1 year time, when we leave the leadership of the project we would have been able to better meet all the criteria, that we will be able to find a solution to ensure the ling-term sustainability of the IA.

- Referring to your analysis above, which actions should be implemented to improve its sustainability? Make an action list here and indicate the time-frame (short- / mid- / long-term) and expected outcome for each action.

Short-term actions:

- Sign the agreements with the FO and the Consortium on the functioning of the fund including monitoring and evaluation responsibilities

- Search for private and public investors, for the first pilot trial transactions

- Awareness campaign

Medium-term actions:

- Find a way to secure a minimum amount of yearly money to self-sustain the IM after the SINCERE leadership.

- Include the contract of a third parti to do facilitation, monitoring and marketing tasks for the FO Association as a transaction cost.

Long-term actions:

- Revision of the pilot trial and include amedments

- How did the process of self-assessing your sustainability (from the screening list until this report) influence your IA? If you think that this process did not have an influence, could you identify the reasons why?

While this process has made us aware of key issues we needed to tackle in the design phase, I am not so sure whether we will use the indicators after the project for monitoring, or not all of them at least. This is a common thing with other projects, we fullfill the indicators sheet because it is compulsory but not as a self-evaluation exercise. Maybe the list is too long and also it is difficult to see who is going to use them afterwards. In the case of the SINCERE project, we had very good indications on how to improve the social sustainability (MAG meetings process and criteria) so it was easy to fullfill this part, we were also experts in the ecological part, so that was easy too, but we did not have expertise or support in the economic part, so here the indicators were indeed useful to show our shortcomings in this aspect but should we have had more advice on ways to practically meet them, the results would have probably been better. Shame that we did not engage in the sustainable business canvas exercise that we were proposed.

- How can the SINCERE sustainability self-assessment tool (from the screening list until this report) be improved in order to play a stronger role in bringing more sustainability into future innovation actions?

The co-definition of the criteria, was interesting although, as in many participatory processes, is difficult to avoid the feeling that another group of people could have come out with another set of criteria. The identification of indicators forced us to be concrete in translating the criteria into indicators that were relevant for our case study, and that was interesting, but we did it a bit more as an academic exercise than because we saw a usefulness in this for us to improve the project. I have the feeling now that we could have found better indicators or less indicators! Maybe the self-assessment tool could work better as a kind of “cheklist” of criteria to be met, with a column just to comment on how each criterion is meet.

Spain/Catalonia – Indicators

Ecological dimension of sustainability

Spain/Catalonia	Selected indicator(s)	Indicator measures / values	Threshold	Sustainability SCORE
				On a scale of 1 to 5
Principle 1: The IM shall preserve and/or enhance the ecosystem structure, including stand structure and biodiversity.				
Criterion 1.1: The IM maintains or restores forest cover and standing stock of biomass (= zero deforestation and sustained level of living biomass).	1.1.1 Forest area (ha)	24,500	≥ 22.500	5
	1.1.2 Total aerial biomass (t) expected in 10 years	0.10%	not reduced > 30%	5
Criterion 1.2: The IM maintains and protects biodiversity in its widest sense, including gene diversity, species diversity and landscape diversity.	1.2.1 Diversity of forest land uses	3	≥ 3	5
	1.2.2 Rate Final Index of Biodiversity Potential (IBP) /Initial IBP	1.2	≥ 1	5
	1.2.3 Compliance with Nature conservation legal requirements	yes	yes	5
Criterion 1.3: the IM maintains and enhances forest vitality, including increased resilience to drought, fire, storm, pests and diseases and other disturbances.	1.3.1 Rate Final Annual wildfire probability/Initial	1.1	≥ 1	5
	1.3.2 NDVI vitality Index	= Initial value	≥ Initial value	3
Principle 2: The IM shall preserve and/or improve the ecosystem functions.				
Criterion 2.1: The IM preserves/enhances the ecosystem functions that are ensuring its long-term vitality and productivity, and its flow of ecosystem services, including closed biogeochemical cycles, continued carbon sequestration, erosion control, control over water fluxes, pollination, etc.	2.1.1 Expected Basal area distribution per forest type (m2/ha) in 10 years after treatment/present value	1	≥ 1	4

	2.1.2 Expected Carbon balance in 10 years after treatment / present value	3.4	≥ 1	5
	2.1.3 Expected Water provision in 10 years after treatment / present value	1.8	≥ 1	5
Principle 3: The IM shall have a holistic approach for its design, planning, implementation and monitoring phase, considering the appropriate spatial and temporal scales, and considering impacts inside and outside the area of focus, on short and long terms.				
Criterion 3.1: The IM favors landscape approaches with a harmonious integration of different land uses (different forest types, agriculture, wetlands) in the provision of the targeted ES within the focal area.	3.1.1 Number of forest land uses tackled	2	≥ 2	4
	3.1.2 Existence of a planning instrument at landscape scale	yes	yes	5
Criterion 3.2: The IM also ensures ecological sustainability along the further value chain (e.g. carbon balance of the further product cascade).	3.2.1 Type and quantity (t) of products	2	≥ 2	3
	3.2.2 Variety of product categories	2	≥ 2	3
	3.2.3 Mean distance to the markets of the different forest products.	42	≤50 km	5
	3.2.4 Implementation of long rotation or tree oriented silvicultural models	Yes	yes	5
Criterion 3.3: The IM should identify, keep a close eye, and report critical ecological indicators and thresholds.	3.3.1 Critical ecological tresholds defined and included in periodical monitoring	yes	yes	5
Criterion 3.4: The IM should identify and avoid any potential negative environmental impact inside or outside the focal area, on short term or long term.	3.4.1 Number of legal complaints	0	≤1	5
	3.4.2 Rate of number of hectares managed under a forest management plan annualy/ present value	1.1	≥ 1	5

Social dimension of sustainability

	Selected indicator(s)	Indicator measures / values	Threshold	Sustainability SCORE On a scale of 1 to 5
Principle 4: The IM shall be broadly accepted.				
Criterion 4.1: Participation is ensured at all stages of the IM development process to strengthen its legitimacy and relevance. Priority setting and assessment of ecological, cultural, social and economic values are done in a participatory way, agreed with the stakeholders.	4.1.1 Existence of an estrategic participated planning	yes	yes	5
	4.1.2 Number of participatory processes conducted in the design of the IM	4	4	5
	4.1.3 Existence of a participation mechanism	yes	yes	5
Criterion 4.2: The IM strives to meet a defined goal that is understandable and acknowledged by all stakeholders.	4.2.1 Participation of all grups in the participatory processes and meetings	yes	yes	4
	4.2.2 Existence of agreed Common rules	yes	yes	5
Principle 5: The IM shall contribute to improve community relationships and enhance social capital in the region.				
Criterion 5.1: The IM development process enables and ensures the involvement of a diversity of actors and values.	5.1.1 Number and type of participants in the meetings of the process	between 1 and 5 per type	at least 1 per type	5
Criterion 5.2: The IM includes mechanisms to ensure efficient, free and fair communication between stakeholders, taking into account the potential impacts of power relations within and between stakeholder groups on the deliberations as well as on access to them. The IM identifies, prevents and when necessary addresses tensions or conflicts.	5.2.1 Inclusion of facilitating services in the meetings	yes	yes	5

Criterion 5.3: The participatory process aims at fostering the emergence and sharing of common understanding and common values, and ensure a coherence between those values and the actions planned in the IM.	5.3.1 (=4.2.2) Existence of agreed Common rules	yes	yes	5
Criterion 5.4: The IM includes the recognition of each actor's role in forest and ES governance and strive for awareness and recognition of co-responsibility.	5.4.1 Number of groups of actors involved compared to all the stakeholders' categories	80%	≥70%	5
Principle 6: The IM shall promote equitable solutions or alternatives, that trigger/stimulate new forms of coordination and a culture of negotiation including all relevant actors.				
Criterion 6.1: The IM aims at realizing equity in access to the IM (e.g. between big and small forest owners).	6.1.1 Forest size and type of the forest owners participating in the mechanism (i.e. in the forest owner's association)	28 provisional (5 municipalities). Average size =171 ha (60- 300ha)	> 30 (at least in 5 out of 6 municipalities)	4
	6.1.2 Number and size of the forests of the owners invited to participate (i.e to which a letter has been sent)	1029, of all sizes	500 (50 % of total)	5
Criterion 6.2: The IM aims at equity in access to the enhanced ES provision or quality, and maintains or enhances access to the other products/services the forest provides.	6.2.1 Number of provision and regulation services offered	5	5	5
	6.2.2 Number of ES improved	5	5	5
Criterion 6.3: The IM aims at equity in the distribution of (economic) benefits/income and costs. It aims at a balanced delivery of both public and private benefits.	6.3.1 Mean costs of the forestry treatments	2000 €/ha	< 4000 €/ha	5
	6.3.2 Mean income of the transactions	NA	50 % of total costs	1

Economic dimension of sustainability

	Selected indicator(s)	Indicator measures / values	Threshold	Sustainability SCORE
				On a scale of 1 to 5
Principle 7: The IM shall be economically viable in the long-term.				
Criterion 7.1: The IM creates new sources of income for forest ES provision (quality and quantity).	7.1.1 Total amount of private money invested in the mechanism	NA	> 50 % of the offer	1
	7.1.2 Total amount of public money invested in the mechanism coming from new sources other than the forestry department	NA	> 50 % of the offer	1
Criterion 7.2: The IM is cost-efficient, economically viable and, when possible and relevant, profitable.	7.2.1 Transaction costs and intermediaries	NA	< 7 % of the total transaction	1
Criterion 7.3: The IM aims at synergies and avoids or reduces harmful trade-offs between the targeted ES and other ES. It aims at creating bundles of ES including those that are not easily quantified and monetized.	7.3.1 Number of provision and regulation services provided	5	≥2	5
	7.3.2 Number of improved FES	5	≥3	5
Criterion 7.4: IM contributes to the local economy and improves the conditions of local communities, by supporting local economy's development, diversification and resilience.	7.4.1 Number of investments made in the forest annualy	NA	≥3	1
	7.4.2 Number of tourist services provided annually	NA	≥4	1

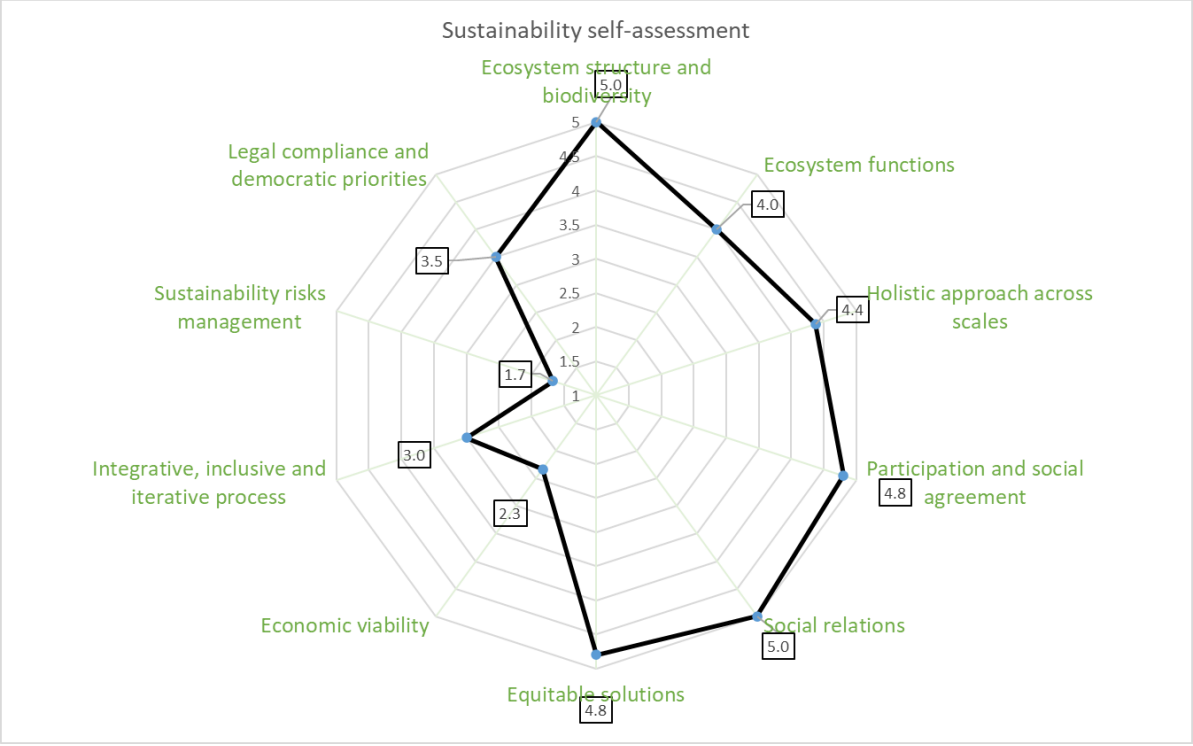
Institutional dimension of sustainability

	Selected indicator(s)	Indicator measures / values	Threshold	Sustainability SCORE On a scale of 1 to 5
Principle 8: The IM shall be designed and implemented through an integrative, inclusive and iterative process.				
Criterion 8.1: The IM aims at cross-sectoral coherence, by embedding it in a broad territorial vision and plan, that matches local history and culture.	8.1.1 Creation of a participatory landscape plan	yes	yes	5
Criterion 8.2: The IM is based on an integrated assessment of all environmental, social and economic values. It builds upon a strong scientific basis that combines a set of appropriate methods and disciplines to obtain comprehensive and acceptable valuation results. It considers how decisions will accommodate incomplete valuations of ES.	8.2.1 Existence of a sound scientific design in the diagnosis and valorisation of ES	yes	yes	5
	8.2.2 Identification of uncertainties and existence of precautionary measures	yes	yes	5
Criterion 8.3: The IM includes a learning mechanism, which feeds the outcomes of this analysis back into the implementation process.	8.3.1 Number of monitoring and impact reports	NA	≥ 1	1
	8.3.2 Number of revision meetings conducted with all actors (same as 9.1.3)	1	≥ 1	3
	8.3.3 Existence of a legal agreement amongst the actors that includes the need for monitoring and revision	NA	yes	1

Criterion 8.4: The IM design and implementation process is characterized by inclusiveness. The IM achieves inclusion of stakeholders in knowledge production and IM design, to include hidden social-ecological values, deal with power asymmetries and improve societal relevance of the valuation and the IM.	8.4.1 Existence of annual monitoring reports	NA	≥ 1	1
	8.4.2 Number of monitoring meetings	NA	≥ 1	1
	8.4.3 Type and number of participants	28 forest owners; Investors NA yet		3
	8.4.4 Degree of satisfaction by stakeholders about the process	7 (project survey)	≥ 7 (1-10)	3
Principle 9: The IM shall deal with sustainability risks internally or through existing institutions.				
Criterion 9.1. A dedicated governance platform/committee/representation is operational to review the process, manage sustainability risks or tensions, and address complaints from concerned stakeholders.	9.1.1 Creation/existence of platform and responsibilities	yes	yes	3
	9.1.2 Number of monitoring meetings	NA	≥ 1	1
	9.1.4 Rate of complaints that were addressed/replied to	NA	≥ 80%	1
Principle 10: The IM shall align with democratically set priorities and legal frameworks.				
Criterion 10.1: The IM complies with existing laws, and where relevant, with customary and traditional rights.	10.1.1 Number of rules	1	≥ 1	3
	10.1.2 Number of proposals for the improvement of the regulatory framework	NA	≥ 1	1

Criterion 10.2: The activities carried out through the IM are consistent with the rules and targets of the (public) funding which it uses (conditionality criteria are met). It aims as well at synergies with other public funding efforts mobilized in same the area and domain.	10.2.1 Number of proposed actions that cannot be financed by other public institutions	2	≥ 1	5
Criterion 10.3: The IM demonstrates added-value, or an improvement beyond current practices and context and when necessary a discontinuation of "business-as-usual".	10.3.1 Number of additional requirements implemented in each forestry treatment applied	5	≥ 1	5

Overall SSA (spiderweb copy-pasted in the questionnaire)



Principles	Keywords	Average scoring
Principle 1: The IM shall preserve and/or enhance the ecosystem structure, including stand structure and biodiversity.	Ecosystem structure and biodiversity	5.00
Principle 2: The IM shall preserve and/or improve the ecosystem functions.	Ecosystem functions	4.00
Principle 3: The IM shall have a holistic approach for its design, planning, implementation and monitoring phase, considering the appropriate spatial and temporal scales, and considering impacts inside and outside the area of focus, on short and long terms.	Holistic approach across scales	4.38
Principle 4: The IM shall be broadly accepted.	Participation and social agreement	4.80
Principle 5: The IM shall contribute to improve community relationships and enhance social capital in the region.	Social relations	5.00
Principle 6: The IM shall promote equitable solutions or alternatives, that trigger/stimulate new forms of coordination and a culture of negotiation including all relevant actors.	Equitable solutions	4.80
Principle 7: The IM shall be economically viable in the long-term.	Economic viability	2.33
Principle 8: The IM shall be designed and implemented through an integrative, inclusive and iterative process.	Integrative, inclusive and iterative process	3.00
Principle 9: The IM shall deal with sustainability risks internally or through existing institutions.	Sustainability risks management	1.67
Principle 10: The IM shall align with democratically set priorities and legal frameworks.	Legal compliance and democratic priorities	3.50