InnoForESt

Smart information, governance and business innovations for sustainable supply and payment mechanisms for forest ecosystem services

GA no. 763899

D6.3 Set of policy recommendations for EU wide governance strategy for sustainable forest ecosystem service provisioning and financing

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Executive summary

Global environmental problems, increasing urbanisation, industrialisation pressures, and market dynamics among others, hamper the balanced provision of the full range of forest ecosystem services (FES). At the same time, societal demand, particularly for regulating and cultural FES is increasing. Yet thus far, forest owners are usually unable to generate revenues off the broad range of ecosystem services their forests provide, forcing them to base management decisions on marketable goods, mainly on timber production. Between 2017 and 2020 InnoForESt has worked with and in six local level initiatives across Europe to analyze and (further) develop innovative governance mechanisms for securing FES provision and financing. The governance innovations in focus can largely be grouped into network-centered and payment mechanism-centered approaches.

This report draws on project findings regarding stakeholder network development, governance innovation development for FES-related income opportunities, and payment mechanisms for FES provision and financing to present **targeted recommendations** to the following actors:

- Forest owners and managers (chapter 2.1)
- Non-Governmental Organisations (NGOs) & associations (chapter 2.2)
- Non-sectoral Entrepreneurs (chapter 2.3)
- Local-level policy-makers (chapter 2.4)
- National & EU level policy-makers (chapter 2.5)
- Scientist and future research funding (chapter 2.6)

In addition to actor-oriented recommendations, the following **overarching conclusions** have emerged:

- Governance mechanisms (potential) impacts on forest management, FES provision, and forest-based income can vary considerably. These are three distinct elements and not necessarily mutually reinforcing.
- Payment mechanisms financing the provision of FES require a clear denomination of the (different) FES addressed, clearly defined FES related objectives and context specific solutions.
- Securing FES provision and financing hinges on public policy and support which can be integrated into public policies and initiatives that already exist in the fields of rural economic development, climate change resilience, and biodiversity protection and should be addressed more explicitly in new and emerging related policy strategies.
- Currently policy demand for FES provision is largely reactive to shortage. Needed is a turn towards proactive policy formulation. A number of ongoing related policy initiatives may offer windows of opportunity to pro-actively foster the future provision of FES, in particular regulating and cultural FES, others may reduce their future availability. FES assessment and monitoring systems should be prerequisites for respective public support and should include data on ecologic forest conditions, societal demand for FES, as well as information on the institutional setting and economic revenue streams.
- The biggest political potential for advancing means for the sustainable provision of FES lies in the further development and implementation of the 'Green Deal' and the EU Forestry Strategy provided the structural change actively integrates the important role of multifunctional sustainable forest management.

- While FES-related innovation systems are inherently a context-bound social-ecological-technical issue, a certain level of homogenisation of national FES-supportive regulation and legislation within the European Union is expected to enhance FES provision and financing.
- Building diverse stakeholder networks is important for local level governance innovation development. Forest owners and managers play a key role in these networks.
- Findings indicate that the potential of private market based innovative governance mechanisms is limited to complementing policy led and public efforts to secure FES provision and financing.

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Abbreviations

AT	Austria
CINA/CTA	Constructive Innovation Assessment / Constructive Technology Assessment
CZ	Czech Republic
D	Deliverable
DE	Germany
DIY	"Do it yourself"
EC	European Commission
EUSTAFOR	European State Forest Association
FES	Forest ecosystem services
FI	Finland
FVA	Forest Research Institute Baden-Wuerttemberg, Germany
InnoForESt	Smart information, governance and business innovations for sustainable supply and payment mechanisms for forest ecosystem services
IT	Italy
IR	Innovation Region
LULUCF	Land use, land-use change, and forestry
NGO	Non-Governmental Organisation (non-profit)
SETFIS	social-ecological-technical-forestry-innovation systems
SK	Slovakia
SW	Sweden
WP	Work Package

1 Introduction

1.1 Objectives of this report

This report is written in the context of InnoForESt project objective 4, which is to derive „*policy and business recommendations for forest managers, policy-makers, businesses, and NGOs, from the local and regional to the national and EU level (...) for establishing, assessing and implementing innovative governance strategies, Payment mechanisms, business models and financing mechanisms for forest ecosystem services across Europe.*" (InnoForESt Grant Agreement, p. 130). It summarises relevant insights generated and lessons learned by the international, inter- and transdisciplinary and multi-actor based project consortium over the course of almost three years of research and real-world innovation development. Based on research results and systematically documented experiences, the report aims to formulate targeted policy and business recommendations and options for action for forest owners/managers, non-profit NGOs & associations, entrepreneurs, local, national and EU policy-makers, as well as scientists, on how they can use their position and resources to advance governance innovations for the sustainably provisioning and financing of FES.

While the actual outreach to specific target groups as well as the production of associated outreach materials is beyond this deliverable's scope, it does provide the content necessary to produce and disseminate such materials. To this aim the report is structured in a way that allows selective reading: The main chapters 'InnoForESt in Context', 'Materials and Methods', 'Targeted recommendations and options for action', and 'Concluding remarks' provide the overall relevant information. The sub-chapters 2.1 to 2.6 can be read selectively. They present recommendations regarding stakeholder network development, facilitated innovation development, maintaining direct links to FES provision, and payment mechanisms for FES provision addressed specifically to the following actors:

- Forest owners and managers (chapter 2.1)
- NGOs & associations (chapter 2.2)
- Entrepreneurs (chapter 2.3)
- Local level policy-makers (chapter 2.4)
- National & EU level policy-makers (chapter 2.5)
- Scientist and research funding entities (chapter 2.6)

The annex contains supplemental information for each IR according to their primary FES governance innovation approach. They contain information regarding the development of their respective stakeholder networks, innovative payment mechanisms, and their (potential) implications for forest management and FES provision at three points in time: before working with InnoForESt, after having worked with InnoForESt for almost three years, and finally the IRs' visions for the future.

The annex further includes templates used in the context of an interactive session at a consortium meeting in 2019, which focused on the governance innovations (potential) impact on FES provision in the IRs and related recommendations to draw from the IRs' and WPs' insights. The templates are referenced in the text.

1.2 InnoForESt in Context

European forests provide numerous benefits to society, ranging from purifying air and water to conserving biodiversity, protection from landslides, floods and avalanches, to scenic beauty, recreational, educational and cultural settings, and tangible forest products like fuel, timber, woody biomass, but also edible mushrooms, berries, ornamental plants and many more. Yet, the continued availability of the various regulating, cultural and provisioning Forest Ecosystem Services (FES) is in jeopardy; European forests and the forestry sector are affected by global environmental problems, increasing urbanisation, industrialisation pressures, and market dynamics that prioritise provisioning above regulating and cultural FES. Forest owners are usually unable to generate revenues off the broader range of ecosystem services their forests provide, forcing them to base management decisions on marketable goods, mainly timber production.

At the same time, societal demand for often non-marketable cultural and regulating FES, such as recreation, biodiversity, water retention and carbon sequestration, continues to increase on public and private land. Currently, the provision of FES, particularly regulating and cultural FES in Europe, is largely facilitated through public land management. On public land, the opportunity costs incurred due to reduced timber sales are largely accepted. Different countries provide different policies, laws and regulations, administering forest and FES management also on private land, including some financial support programes for changes in private forest management such as compensating income lost due to e.g. nature conservation requirements. Still, existing strategies and initiatives at the European and pan-European level have not been able to effectively and sufficiently address the under-provision or under-valuation of regulating and cultural FES and the costs for their targeted management, especially in private forests. Established market mechanisms appear to provide insufficient incentives to realise this objective. As a result, demand for non-marketable FES continues to exceed its short-term economically viable supply, causing social costs and often one-sided policy and forest management decisions.

Politically, there is an interest to increase private sector involvement in securing the provision of FES. This leads to the interest in researching “innovative governance mechanisms” that might improve this situation.

Roughly speaking, governance is about 1) who decides what the objectives of a certain decision like a management strategy or development approach are, what to do to pursue them, and with what means, 2) how those decisions are coordinated e.g. hierarchically, by networks or markets 3) who holds power, authority, and responsibility, e.g. individuals, businesses, organisations, and 4) who is (or should be) held accountable, e.g. for implementation and potential liabilities.

Governance mechanisms, especially environmental governance mechanisms, are consequently the ever-changing forms of social coordination in which any management decision, including those concerning FES, take place. Depending on the topic, a variety of actor groups are engaged in interdependent relationships and power relations. Simplistically, they come from three main but overlapping spheres: state, market, and civil society. These actors interact with one another in formal or informal ways with varying influence.

In general, these are multi-level interactions (i.e., local, national, international/global) with a broad variety of mutually influencing 'rules of the game' or governance modes ranging from hierarchical (like laws and regulations, but also dominance) to market-based (esp. income oriented, supply and demand driven) and cooperative/collective forms.

Against this background, InnoForESt's objective has been to identify, analyze, and enhance innovative governance mechanisms targeting especially private market-based approaches that show potential to become alternative or complementary means to currently predominantly public efforts of securing FES provision and financing.

A number of on-going policy processes offer windows of opportunity to proactively foster the provision of FES – in particular regulating and cultural FES – though innovative governance mechanisms. First and foremost, the European Green Deal and associated strategies, particularly the EU Farm to Fork Strategy[1], the EU Biodiversity Strategy 2030[2], the EU Climate Action[3], LULUCF[4], and the development of the EU Forest Strategy[5]. Most of these initiatives emphasize forests' role in sequestering carbon and biodiversity protection. Several mention the need for creating incentives for forest management to achieve these objectives – e.g. the EU Farm to Fork strategy explicitly states the need for compensation payments and an associated system of robust certification rules for carbon sequestration. Other EU policies also touch on forests' role in carbon sequestration, such as the EU emissions trading system[6], or the EU Taxonomy for sustainable activity[7].

[1] https://ec.europa.eu/food/farm2fork_en

[2] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/eu-biodiversity-strategy-2030_en

[3] https://ec.europa.eu/clima/index_en

[4] Land use, Land Use Change and Foresty (LULUCF); EU Member States have to ensure that greenhouse gas emissions from land use, land use change and forestry[4] are offset by the removal of at least an equivalent of CO_2 from the atmosphere in the period 2021 to 2030 through actions within the sector. Looking at both, short- and long term, forests and their targeted management can be seen as a rational option for improving the global carbon balance. (https://ec.europa.eu/clima/policies/forests/lulucf_en)

[5] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12674-Forests-new-EU-strategy

[6] The EU emissions trading system is the world's first major carbon market and largest existing system of its kind. It operates in all EU Member States as well as Iceland, Liechtenstein and Norway and covers around 45% of the EU's greenhouse gas emissions. On various levels, parties strive to better include forests in the carbon market and create a more effective system, which pays for carbon credits from forests (https://ec.europa.eu/commission/news/new-bioeconomy-strategy-sustainable-europe-2018-oct-11-0_en)

7 The EU Taxonomy for sustainable activity is a work stream to support the European Green Deal by channeling private investment towards a climate-neutral economy. It is a tool which will impact forestry directly by helping investors, businesses and governments to access green financing to improve their environmental performance, as it also helps to identify and address activities which are already environmentally friendly. It is expected to facilitate the development of low-carbon sectors while de-carbonising high-carbon sectors. Forestry is considered one of the sectors that can contribute significantly to climate change mitigation, which means that it can attract additional investments (https://ec.europa.eu/commission/news/new-bioeconomy-strategy-sustainable-europe-2018-oct-11-0_en)

InnoForESt findings suggest that in addition to payments related to carbon sequestration or biodiversity conservation, there is value in targeted support for local level initiatives that aim to secure provision of these and other FES through network based approaches. The potential of these policy strategies to foster FES provision can only be realized if the goal of securing FES provision is integrated into existing and emerging governance and funding schemes. It should be addressed as an explicit objective that is pursued through targeted political steering and public support for private *profit and non-profit* business innovations. In this process, the focus should rest on securing in particular the full range of regulating FES, such as air and water quality, soil protection, flood and erosion control, biodiversity conservation as well as carbon sequestration.

The provision of FES is related to further policy initiatives, though not all reference forests and their potential as of yet. For example, the new bio-economy strategy[8] is an action plan to develop a sustainable and circular bio-economy that serves Europe's society, environment and economy. It is part of the Commission's drive to boost jobs, growth and investment in the EU. It aims to improve and scale up the sustainable use of renewable resources to address global and local challenges such as climate change and sustainable development. The document states that in a world of finite biological resources and ecosystems, an innovation effort is needed to feed people, and provide them with clean water and energy. Yet the strategy mainly focuses on maritime and agricultural biomass, plastic recycling, converting and upcycling waste or transforming industrial by-products into bio-based fertilisers. Very little reference is made to the role and potential of forests in this domain.

Finally, widely established market-based instruments influencing the provision of FES include certification schemes for sustainable forest management; paramount are here the Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC). They are expected to secure, legitimise or even open new markets for timber from sustainably managed multifunctional forests and ideally provide price premiums. They are actively improving management practices of forest owners, which also directly address the provision of different regulatory and cultural FES. As of today, more public than private forests are covered by these certification schemes.

Given the different biogeographic and national legal and economic frame conditions of forestry within Europe it is not easy and often not supported to unify forest policy at European level. However, there are certain overarching notions which prevail throughout all forests of Europe; one being that forestry is one of the central sectors that serve a role in mitigating climate change and another promoting the societal and ecological value of non-marketable FES.

Although the importance of regulating and cultural FES is directly or indirectly recognised in most EU and national forest related policies, strategies and laws for Biodiversity conservation, Forest and the Forest based sector, and the Bioeconomy (see Primmer et al. 2018/D2.1), forest owners are generally hardly rewarded for their provision.

[8] https://ec.europa.eu/commission/news/new-bioeconomy-strategy-sustainable-europe-2018-oct-11-0_en

One prominent programme for supporting forest management for the provision of currently non-marketable FES is the Natura 2000 network payment, which provides lump-sum payments per hectare managed primarily for biodiversity conservation which is assumed to make up for "income forgone". The programme shows achievements all over Europe, but much slower than scheduled, as in many cases these public compensation payments are not acknowledged to be equivalent to the income forest owners make managing the forest for harvestable timber, especially not in fertile forest stands.

Consequently, innovative governance mechanisms that better include private business-related approaches are sought to complement, upgrade or even supersede legal requirements and publicly funded FES development programs.

Local level initiatives throughout Europe are already working on new ways to align forest management and the development of forest-based products with the provision of all types of ecosystem services based on increasing and diversified societal demands. These initiatives are often driven by forest-related private business endeavors in combination with an inherent idealism to promote but also benefit from the appreciation and valuation of regional FES, alas with variable levels of success, economic sustainability and potential for replicability. Policy-makers on all levels are interested in options for action to better support these kinds of initiatives for the sustainable provision and financing, in particular of currently non-marketable FES.

The InnoForESt project – a Horizon 2020 European Innovation Action – has therefore been created to support enhanced coordination in policy making, and to facilitate the improvement, development and mainstreaming of policy and business innovations dealing with or affecting FES. This shall foster the sustainable and economically viable provision of a broad(er) range of FES across Europe, in particular those that lack market values but are of tremendous importance for societal wellbeing, i.e. cultural and regulating FES. For this endeavour, an inter- and transdisciplinary consortium has been formed by 16 institutional project partners from nine European countries to include about the same amount of scientists from different universities and research institutes on the one hand as well as practitioners from different fields and organisational affiliations on the other.

The scientists involved in this project represent a variety of disciplines. Their academic work has been organised in individual Work Packages (WPs), each with a particular thematic focus. The practitioners work in different capacities and represent, for example, NGOs, public administration, and private business engaged in local level initiatives related to FES provision and financing. Finally, some of the scientists are working very closely with or even for a practice partner organisation, taking on a kind of 'hybrid' role and acting as a liaison between academia and the implementation level.

From late 2017 to 2020, the InnoForESt consortium has accompanied and analyzed the experiences of six so-called 'Innovation Regions' (IRs) in their pursuit of developing innovative governance mechanisms that aim to secure the future provision and financing of FES. Located in seven European countries, the IRs vary with regards to the forest bio-geographical region, the particular (set of) FES in focus, and the innovative governance mechanism they pioneer to secure their future provision.

Nevertheless, each IR can be subsumed either under a primarily stakeholder network based approach and/or as focusing primarily on the development of a payment mechanism for FES provision (see also Table 1, more details on each IR's FES related developments can be found in the Annex). Scientists and practitioners have worked together in what is referred to as 'IR Teams' and scientists have taken the role of facilitating, supporting, and analyzing the respective innovation development processes in the InnoForESt context.

Table 1 Overview Innovation Regions

Innovative governance mechanism	Innovation Region	Forest Ecosystem Service(s) targeted
Payment mechanism	Finland "Habitat Bank"	regulating FES: Biodiversity
Payment mechanism	Germany (Mecklenburg-Western Pomerania) "Forest Share/Waldaktie"	regulating FES: CO2 Sequestration
Payment mechanism (CZ) & Network approach (SK)	Czech Republic and Slovakia (Cmelak resp. Hybe) "Collective Governance of Ecosystem Services"	regulating FES: CO2 sequestration, biodiversity
Network approach	Italy (Autonomous Province of Trento) "Forest pasture system management"	regulating FES: Water regulation, natural hazards protection, biodiversity cultural FES: Tourism and recreation, rural tradition
Network approach	Austria (Eisenwurzen) "Value chains for forest and wood"	provisioning FES: Timber (hard- and softwood) cultural FES: Tourism, recreation, regulating FES: biodiversity
Network approach/hierarchy	Sweden (Helsinki) "Love the forest"	cultural FES: Tourism, recreation and cultural values

1.3 Materials and Methods

This report is based on different types of primary and secondary sources, including project deliverables, project internal documents (see section 'Documents' below), as well as data gathered in the context of a project workshop on the topics of this report (see also sections 'Survey' and 'Recommendations Workshop'). A first version of this report was compiled by WP6/FVA in July 2020[9]. Draft versions of it were shared with scientists who were working on relevant deliverables at the time of writing, to make this report as comprehensive as possible.

[9] The original deadline of this deliverable (M30) was shifted twice to accommodate the – partly modified – timelines and schedules of several project milestones, deliverables (D), and activities, which were intended to inform this report (in particular, Aukes et al. 2020/D4.2, Aukes et al. 2020/D5.3). Following the first official extension for this deliverable D6.3 by the EC from M30 to M33 (approved on November 8th 2019), the COVID-19 induced lock-down resulted in further delays of project activities and postponement of associated deliverables followed by a further request and approval for extension of the deadline for this report to December 2020.

Further insights documented in deliverables due after July 2020 (see also list directly below) were then added between August and November 2020 by the respective authors before the report's final submission.

1.3.1 Secondary Sources

Project documents, including draft versions of upcoming deliverables, which provide the foundations for this report are:

- InnoForESt Grant Agreement
- D2.1: Primmer, E., Orsi, F., Varumo, L., Krause, T., Geneletti, D., Brogaard, S., Loft, L., Meyer, C., Schleyer, C., Stegmaier, P., Aukes, E., Sorge, S., Grossmann, C., Maier, C., Sarvasova, Z., Kister, J. 2019. Mapping of forest ecosystem services and institutional frameworks (version v1.1)).
- D2.2: Geneletti, D., Primmer, E., 2019: Institutional and Biophysical Maps of FES in Europe. https://syke.maps.arcgis.com/apps/webappviewer/index.html?id=e27ae600fad1451fa3ed4109ae309856.
- D2.3: Varumo, L., Primmer, E., Orsio, F., Geneletti, D., Krause, T., Brogaard, S., 2020. Inventory of innovation types and governance of innovation factors across European socio-economic conditions and institutions (delivered April 2020).
- D3.1: Sorge, S., Mann, C., 2019. Analysis framework for the governance of policy and business innovation types and conditions (delivered in October 2018, revised August 2019).
- D3.2: Kluvánková, T., Špaček, M., Sorge, S., Mann, C., Schleyer, C., 2020. Application summary of prototypes for ecosystem service governance modes – demonstrator (delivered January, 2020).
- D4.1: Sattler 2019. Mixed method matching analysis (delivered October 2019).
- D4.2: Aukes, E., Stegmaier, P., Schleyer, C., 2020. Set of reports on CINA workshop findings in case study regions, compiled for ongoing co-design and knowledge exchange (delivered April 2020).
- D 4.3: Loft, L., Stegmaier, P., Aukes, E., Sorge, S., Schleyer, C., Klingler, M., Zoll, F., Kister, J., Mann, C. 2020. The emergence of governance innovations for the sustainable provision of European forest ecosystem services: A comparison of six innovation journeys (delivered October 2020)
- D5.1: Aukes, E., Stegmeier, P., Hernández-Morcillo, M. 2019. Interim Ecosystems Service Governance Navigator & Manual for its Use (delivered January 2019).
- D5.2: Schleyer, C., Kister, J., Klingler, M., Stegmaier, P. Aukes, E. 2018. Report on stakeholders' visions, interests and concerns (revised version as of September 2019).
- D5.3: Aukes, E., Stegmeier, P., Schleyer, C., 2020. Final report on CTA [CINA] workshops for ecosystem service governance innovations: Lessons learned; (delivered 3. Dec 2020)
- D5.4: Schleyer, C., Kister, J., Klingler, 2020. Design on training events to develop innovation capacities and innovation knowledge.
- D5.5: Aukes, E., Stegmaier, P., & Hernández-Morcillo, M. (2020). Ecosystems Service Governance Navigator & Manual for its Use.
- D6.2: Maier, C., Grossmann, C. 2019. Interim Report on Replicability and Upscaling Potentials of Governance Innovations (favoring provisioning and financing of forest ecosystem services) (delivered July 2019).

- D6.4: Morand, S., Budniok, M., Grossmann, C.M., Maier, C., Chubb, L., Fox, M. 2020. Updated Communication Plan - provides the overall communication strategy of project results and recommendations (delivered Dec 2020)

1.3.2 Primary Sources

Findings documented in (draft versions) of the above listed project documents, served as the first basis for this report and for preparing a 'Recommendations Workshop' and a 'Pre-Recommendations-Workshop Survey'. The results of these two primary sources served as additional important pillars to the writing of the present report.

Pre-Recommendations-Workshop-Survey

In April 2020, WP6-FVA organised a 1.5-day workshop with representatives of all WPs and most IR teams. Due to COVID-19 related travel restrictions, the workshop was held virtually. It served to reflect and discuss each WP's contribution to the project's overarching objective of securing the future provision and financing of FES with a strong focus on the practitioners' perspective on the perceived impact on securing FES provision and financing in their individual IRs (see also 'Recommendations Workshop' below). In preparing the workshop, a pre-recommendations-workshop survey was launched within the project consortium. Work package representatives and IR teams were asked to respond in writing to specific questions related to the impact InnoForESt activities and outputs[10] had in the IRs, which elements of the InnoForESt process are perceived as recommendable to other initiatives, as well as their conclusions which recommendations could be provided to policy and business representatives for securing the provision and financing of FES (see figure below for an overview of the questions asked). The responses generated valuable insights on numerous positive developments in the IRs, and the impact project activities and outputs have had in the IRs. However, responses to project overarching questions remained rather specific to particular WP or IR contexts, but provided a basis for a facilitated discussion among all project partners in a workshop setting. Findings from this survey and the workshop itself are the primary sources of information for the recommendations presented in this report. The questions asked build on a group work session during the annual project consortium meeting 2019. Teams of practitioners and scientists were tasked to discuss the implications of their InnoForESt related work on forest management and FES provision, and document results on a poster template. These included first thoughts on recommendations to policy-makers and practitioners. While too early for substantial results, the discussions sparked important discussions and reflections on InnoForESt related work (see annex for templates used in the workshop session).

[10] The outputs include tangible project reports, manuals, maps, as well as less tangible items such as virtual exchange platforms, expanded and further developed stakeholder networks, or documented scenarios and visions developed in CINA workshops etc.

Pre-Recommendations-Workshop Survey - Questions directed at InnoForESt scientists

Lessons learned - key insights from your Work Package

What are the top three key insights you gained through your InnoForESt work on the following issues:

- What are characteristics of a promising stakeholder network aimed at securing the provision and financing of FES?
- What are key factors furthering the inclusion of key stakeholders and building a strategic stakeholder network, particularly related to actors owning or managing forests?
- What are key factors hindering the inclusion of key stakeholders and building a strategic stakeholder network, particularly related to actors owning or managing forests?
- What are characteristics of a promising Payment mechanism designed to secure the provision and financing of FES?
- What are key factors furthering the development of a Payment mechanism for FES?
- What are key factors hindering the development of a Payment mechanism for FES?

- **Required support**
- *Please list the three issues you think are most important*
- InnoForESt will end in 2020, yet the digital platform created during the project will remain active for 5 years. In your opinion, how can the digital platform (continue to) support our Innovation Regions in the future in securing the provision and financing of FES? What kind of content or support would you like to see on the digital platform?
- Do you think further research is needed to secure the provision and financing of FES in the future? If so, what are questions you think would aid the pursuit of innovative governance mechanisms for securing the provision and financing of forest ecosystem services?
- How can it be ensured that future research on governance innovations (continues to) contribute/s to securing the provision of forest ecosystem services in the future?

Recommendations

Based on your experience, **what would you recommend the following actors to do** when looking for ways to secure the provision of FES? **What can he or she learn from your experience?**

- ➢ Private forest owners
- ➢ Public forest owners, e.g. state, municipality
- ➢ collective forest owners
- ➢ non-governmental organizations
- ➢ entrepreneurs

For each of these actors, please complete the following sentences*:*

- To learn from others about ways to secure the provision of forest ecosystem services and find funding for it, I would recommend to….
- To build a stakeholder network and reach out to key stakeholders, I would recommend to…
- To design a payment mechanism to fund the provision of FES, I would recommend to…
- To actually make money off of the FES provided by your forests, I would recommend to…
- Other recommendations you would like to provide to these actors:…

Based on your experience, **what do you think policy-makers could to do support you and initiatives like yours** in their efforts to secure the provision and financing of FES?

- ➢ Policy-makers at the local level
- ➢ Policy-makers at the national level
- ➢ Policy-maker at the EU level

Figure 1 Pre-recommendations-workshop survey - questions directed at InnoForESt scientists

Pre-recommendations-workshop survey - Questions directed at InnoForESt IR practitioners

Past-Present-Future

- You have worked with InnoForESt for almost 3 years now. How would you describe your initiatives' status with respect to its stakeholder network, payments for FES provision, impact on forest management and on FES provision before you worked with InnoForESt, today, and in your vision for the future?
- What would be suitable targets for the short/medium/long term future development of your Innovation Region?

Desired Support

Please focus on the 3 most important issues

- What kind of **additional support would you have liked to have from a research project like InnoForESt** but did not (yet) receive?
- InnoForESt will end in 2020, yet the **digital platform** created during the project will remain active for 5 years. In your opinion, how can the digital platform (continue to) support your Innovation Region in the future? What kind of content or support would you like to have through the digital platform?
- Do you think **further research** is needed to secure the provision and financing of FES in the future? If so, what are questions you would like to ask researchers to find out?

Recommendations

Based on your experience, **what would you recommend the following actors to do** when looking for ways to secure the provision of FES? **What can he or she learn from your experience?**

- ➢ Private forest owners
- ➢ Public forest owners, e.g. state, municipality
- ➢ collective forest owners
- ➢ non-governmental organizations
- ➢ entrepreneurs

For each of these actors, please complete the following sentences:

- To learn from others about ways to secure the provision of forest ecosystem services and find funding for it, I would recommend to….
- To build a stakeholder network and reach out to key stakeholders, I would recommend to…
- To design a payment mechanism to fund the provision of FES, I would recommend to…
- To actually make money off of the FES provided by your forests, I would recommend to…
- Other recommendations you would like to provide to these actors

Based on your experience, **what do you think policy-makers could to do support you and initiatives like yours** in their efforts to secure the provision and financing of FES?

- ➢ Policy-makers at the local level
- ➢ Policy-makers at the national level
- ➢ Policy-maker at the EU level
- To support me in my efforts to learn from others about ways to secure the provision of forest ecosystem services and find funding for it, they could…
- To support me in my efforts to expand my network and reach out to key stakeholders, they could …
- To support me in my efforts to design a payment mechanism to fund the provision of FES, they could…
- To actually make money off of the FES provided by your forests, I would recommend to…
- Other recommendations you would like to provide to policymakers

Figure 2 Pre-recommendations workshop survey - questions directed at InnoForESt IR practitioners

'Recommendations Workshop'

Throughout the project one main challenge was to provide for eye-level communication in an international, intercultural and transdisciplinary project, between scientists and practitioners working in different local contexts and languages. One important objective of the 'recommendations workshop' was to create a safe space for all 30 participants, where everyone would have the equal opportunity to contribute to the workshop and to share their point of views. To facilitate such collaborative, interactive setting, the WP6-FVA team incorporated *Design Thinking* Principles into the workshop concept: a problem-solving approach serving to *"accomplish key strategic objectives, whether those objectives involve traditional business outcomes […] or social outcomes […]"* (Liedtka et al. 2017, p. 8). It fosters the capability for innovation and reflection and supports the development of *"more innovative and effective outcomes and processes that create better value for the stakeholders they serve and that make organisations more effective in meeting their missions"* (ibid, p. 8), by engaging *"stakeholders in co-creation"* (ibid, p. 6).

Based on the pre-workshop survey the FVA team prepared several templates in GroupMap.[11] GroupMap is an online tool for planning, brainstorming, reflecting, and documenting group discussions that mirror *Design Thinking* principles. It provides sets of different templates addressing the diverse needs connected to online meetings. Additionally, GroupMap offers a clear and appealing design which makes it easy to work with it – even for people who never used such online tools before.

The first part of the workshop was dedicated to a reflection of the main project activities and their impacts on IR developments. Both the template and the discussion were structured into four different parts: (1) Activities and their impact, (2) Suggestions for improvement, (3) 'How to' - a practitioner's guide to 'Do it Yourself', and (4) How to ensure an impact on FES provision. The answers provided by WPs and IR teams in the preparatory pre-workshop-survey were integrated into the template – thus, they served as a starting point for the discussion and a reminder of the central topics. Prepared guiding questions helped keep discussions focused on the respective goal[12]. This approach enabled a lively debate about the activities' impact on local level initiatives in their efforts to secure FES provisioning and financing. A similar session aimed at a collective reflection on the impact and which of the InnoForEst outputs produced are especially recommendable for use outside/beyond and after the project.

The second part of the workshop focused on deriving common policy and business recommendations for the aforementioned six target groups (forest owners/managers, NGOs & associations, entrepreneurs, local, national and EU level policy-makers). All contributions were to be based on insights generated during the InnoForESt project. In preparation for the workshop, the FVA team developed a hypothetical description of a 'Persona' that represents each target group to be addressed. In *Design Thinking*, a Persona is a portrait of a fictive person.

[11] GroupMap. Retrieved May 25, 2020 (https://www.groupmap.com).

[12] msg. Design Thinking Methoden Katalog. Ideenfindung. Brainstorming. Retrieved May 25, 2020 (https://www.designthinking-methods.com/3Ideenfindung/brainstorming.html).

In the case of the InnoForESt workshop, the Personas were designed by using information provided in the survey responses and by integrating further professional knowledge of the FVA team on likely perspectives of the different stakeholder groups. This approach resulted in a diverse set of characters, representing the needs and interests of forest owners/managers, non-profit NGOs, entrepreneurs, local, national and EU policy-makers, and scientists. Each Persona was introduced to the workshop participants with their FES-related interests and challenges, as well as resources available to them (see chapter 2). The discussion was guided by a set of questions tailored to the particular characteristics of each Persona. The group moderator ensured that the discussion of the targeted policy and business recommendations would directly be derived from the findings of and/or experiences made within InnoForESt. For this second part of the workshop, the participants were split into two groups. The smaller group size allowed for a more intense discussion with more room for everybody to share their own perspectives and thoughts. As the groups discussed two different Personas in parallel before switching personas, each working group had the chance to pick up on the recommendations developed by the former group and to elaborate them or to promote completely new ideas.

The results are documented in a Group Mind Map, another GroupMap template[13]. Mind mapping is a technique to visualise and analyze ideas as well as to illustrate their connections in a clear manner. This process fosters analytical thinking and, at the same time, it allows for a creative thought process.[14] This relates to the characteristic of *Design Thinking* of being possibility-driven and option-focused: it concentrates on *"generating multiple options"* (Liedtka, Salzman, Azer 2017, p. 6) and avoids to focus on *"one particular solution"* (ibid, p. 6). The Personas and the Group Mind Maps facilitated fruitful discussions and enhancements of the preliminary policy and business recommendations in a short period of time. Altogether, the methods and templates used during the workshop were considered as helpful tools with an attractive design which helped to organise a "well-structured" and "goal-orientated" workshop under challenging conditions due to COVID-19 (feedback by participants). The information collected during the survey and the workshop was complemented by direct communication and feedback from IR teams to the authors of this report.

[13] GroupMap. Group Mind Mapping. Retrieved May 25, 2020 (https://www.groupmap.com/map-templates/group-mind-mapping/).

[14] GroupMap. Group Mind Mapping. Retrieved May 25, 2020 (https://www.groupmap.com/map-templates/group-mind-mapping/) and msg. Design Thinking Methoden Katalog. Definition. Mindmapping. Retrieved May 25, 2020 (https://www.designthinking-methods.com/2Definition/mindmappingDE.html).

2 Targeted recommendations and options for action

Three years of InnoForESt have sparked important developments in the IRs towards developing or improving innovative governance mechanisms that are expected to secure FES provision and financing. So far, all innovation developments are ongoing processes that may result in a self-sustaining, economically viable business and/or cooperation) model of FES provision and financing. The recommendations outlined below are therefore based on InnoForESt's experiences initiating and supporting processes that show potential to reach the objective of self-sustaining business models for FES provision and financing.

Five overarching themes have emerged despite the variability in IRs' local contexts, different FES-related objectives, and asynchronous developments during InnoForESt. Generally speaking, they relate to issues that demand consideration during the entire process of working towards an innovative governance mechanism for FES provision and financing. As such, they serve as the structuring backdrop to the target-group specific recommendations and options for action that follow. The project results suggest that all six targeted actor groups can contribute to securing FES provision and financing by catering to one of more of these overarching themes, or by addressing them through different means.

Maintaining Direct Link to FES Provision

Boosting governance innovations for the sustainable provision and financing of FES is the main aim of the project and its activities. While pursuing complex participatory stakeholder network building and governance innovation oriented processes it is important not to lose sight of the topical objective. FES are closely linked to a diversity of economic sectors, related to partially contradicting objectives, and associated stakeholders. Each of these connections can offer an opportunity for securing FES provision and financing. Maintaining the link to and continuously reflecting potential implications for FES provision and financing along the path of developing stakeholder networks, visions for the future and possible approaches is of fundamental importance for the innovation process. This entails including forest sector stakeholders from an early stage in any stakeholder network activities, particularly forest owners and managers. Gaining an understanding about the current supply and demand of various FES, possible customers willing to pay for (particular) FES, as well as opportunities and potential trade-offs associated with increasing the quantity and quality of FES-based (business) initiatives are key steps to maintain a focus on the objective.

In the further development of an innovative governance mechanism, monitoring changes in the quality and supply of relevant FES is important to understanding the impact of the new governance mechanism on the provision of different FES. As InnoForESt has shown, a governance innovation's potential impacts on FES can vary significantly: it can be rather direct, such as in a compensation scheme funding forest restoration activities for biodiversity conservation, (i.e. IR FI); or indirect, such as a wood value chain that creates a market for regional hardwoods and thereby supports a forest conversion towards mixed species forest stands intended to enhance their resilience and biodiversity (i.e. IR AU). Likewise, there is a need to differentiate potential objectives a governance mechanism can have/pursue with respect to FES provision: as our IRs illustrate, the explicit aim or implicit effect can be to either maintain a current level of FES provision (e.g. IR SK) or to increase the quantity and or quality of FES provision (i.e. IRs DE, FI, IT).

Acknowledging this variability and formulating FES-related objectives accordingly are fundamental to developing effective governance mechanisms. Clearly formulated FES targets are also the basis for a monitoring of a governance mechanism's FES impact in the long term (see Maier and Grossmann 2019/D6.2).

Monitoring is of particular importance because FES provision is linked to a number of different policy fields and economic sectors. Though, when integrating multiple objectives for mutual benefit, for example, FES provision and rural economic development, a close monitoring of effects on the supply of various FES is needed. InnoForESt has identified several links between the goal of sustainable provision of FES and rural development. The IR Austria, in the region of Eisenwurzen, for example, works towards building a regional forest-wood-value chain for the purpose of maintaining a vibrant rural economy. Some of the local businesses (plan to increasingly) process regionally sourced, autochthonous hardwood into innovative products. By creating a market for regional hardwood, the production and sale of these products on a larger scale has the potential to refinance forest management decisions that include forest conversions towards a mix of tree species, which in turn would lead to more biodiverse and climate resilient forests in the region. Thus, while rural development based on forest resource extraction does not automatically imply a positive impact on provision of regulating and/or cultural FES, it certainly has the potential to do so – if the non-tangible FES are given sufficient and timely consideration. Similar interrelated direct and indirect positive effects can be expected and need to be monitored in other fields, such as (nature-based) tourism or forest-related educational programmes.

As an attempt to embed the InnoForESt innovations in the larger EU biophysical and institutional context, an extensive mapping activity elaborated on the possibilities to identify regions with similar and with differing biophysical FES supply and as well as on the use policy analysis for the assessment of FES demand (see Box "Biophysical and Institutional Mapping"). The resulting datasets and maps were expected to contribute to an assessment of replication and upscaling potentials of the innovation examples (Maier and Grossmann 2018/D6.2, see also text box below).

Biophysical and Institutional Mapping

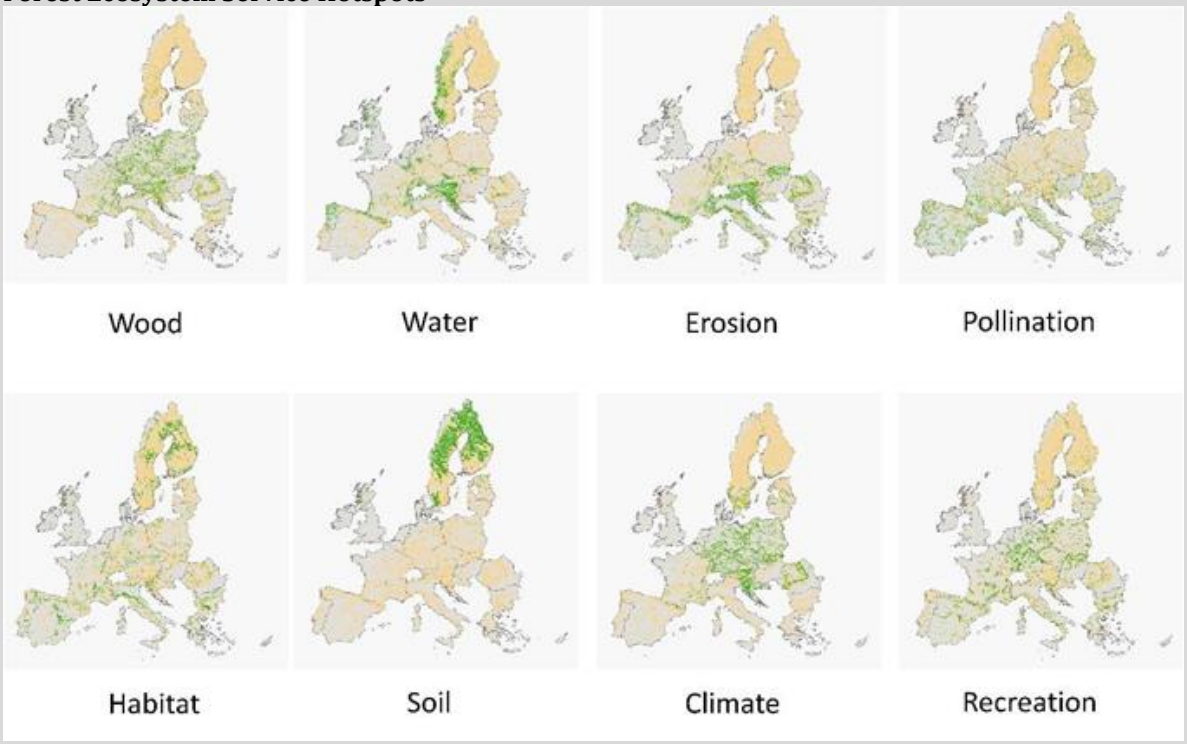
Replicating or upscaling innovations requires a deep understanding of the conditions and contexts that support a particular and successful FES related innovation, both in ecological and institutional terms. In the attempt to embed the InnoForESt innovations in the larger EU context, extensive mapping was conducted to capture the various biophysical and institutional, structural and procedural conditions influencing supply and demand of FES.

FES supply was investigated by means of spatial analysis at the European scale focused on the following services: wood, water supply, erosion control, pollination, habitat protection, soil formation, climate regulation and recreation. The maps are available here: https://syke.maps.arcgis.com/apps/webappviewer/index.html?id=e27ae600fad1451fa3ed4109ae309856. This analysis allowed us to identify hotspots and bundles of FES. Hotspots represent forest areas characterised by a very high provision of a specific ecosystem service, whereas bundles represent areas characterised by a similar level of supply of the same set of ecosystem services (see maps below).

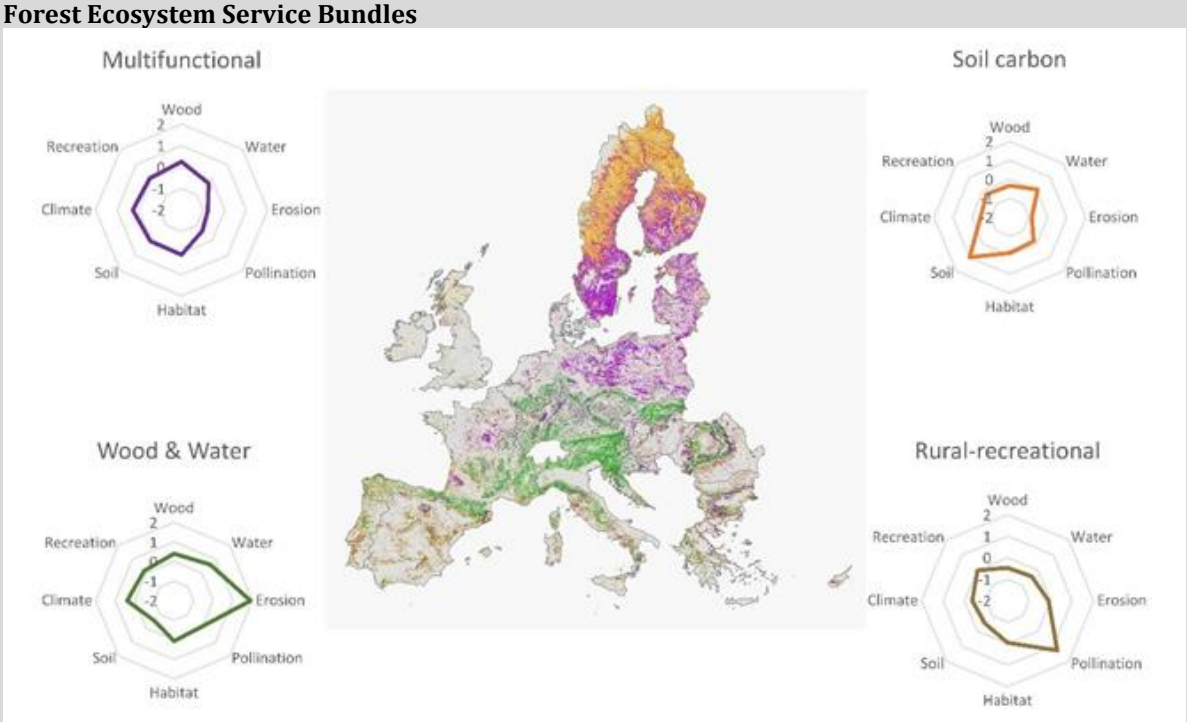
In terms of FES demand, we propose that medium term societal demand could be derived from formal goals and argumentation in public strategies. A detailed analysis of policy documents covering European strategies, national or regional strategies and/or legislative documents from all InnoForESt case study countries or regions was conducted.

The information derived from biophysical and institutional mapping could then be used, for example, to develop sustainable landscape plans, design nature-based solutions, assess the dependence of a region on ES produced elsewhere or estimate the role played by a region in guaranteeing ES to one or more regions, as well as to identify ES for which further investment is needed.

Forest Ecosystem Service Hotspots



Forest Ecosystem Service Bundles



Contribution by Geneletti and Primmer 2020

Figure 3 Biophysical and Institutional Mapping

Bringing diverse stakeholders together

The IRs involved in InnoForESt went through a systematic and comprehensive process of identifying and reaching out to stakeholders interested in the development of innovative FES-related business and governance models. In the first project year, InnoForESt scientists worked directly with IR practitioners to conduct a stakeholder analysis for each respective IR. The portfolio of methods used and the results were documented in Schleyer et al. 2018/D5.2.

IR practitioners reported benefiting greatly from the analysis as it:

- resulted in a better understanding of the spectrum of potential stakeholders, and their interests, including their openness towards innovative ideas.
- supported the decision to include/exclude certain stakeholders.
- facilitated a reflection of past stakeholder-related decisions that were made before the formal stakeholder analysis was conducted.

Several IR practitioners described the stakeholder analysis as an important step for the further development of their governance innovation that ultimately made their network building effort more effective and inclusive. While initiatives not involved in a research project may not have access to the same kind of conceptual and methodological support, InnoForESt will provide a practitioner-oriented brief manual which details the steps to take when conducting a stakeholder analysis (see Sattler 2019/D4.1, Aukes et al. 2020/D5.5).

The InnoForESt Approach

The InnoForESt approach to bringing stakeholder together is based on close collaboration between all partners in a case-sensitive manner. InnoForESt uses the so-called Ecosystems Service Governance Navigator & Manual for its Use (Aukes et al. 2019/D5.1) developed over the first year of the project in close collaboration with all partners and in close exchange with them about what needs and can be done under each regional circumstance. It entails a compendium of 'heuristics', understood as a set of practical tools (yet rooted in theory) integrating the project knowledge generation and communication approach to forest ecosystem services (project glossary, analytical framework, fact sheets, typologies, workshops, etc.). It aims at giving orientation, not setting hard rules." (Aukes et al. 2019:1). The updated version of this InnoForESt Deliverable (Aukes et al. 2020a/D5.5) will be publicly available from the end of December 2020. This Navigator looks at the approach in retrospect on the completed project and draws numerous examples and references from studies accompanying the innovation efforts that have since been completed.

The approach is based on the assumption that two requirements need to be met in order to have a chance to get innovations off the ground: the basis in thorough research into the current initial situation and past efforts to achieve something similar (comprehension and recognition of the real, existing Forest Ecosystem Services (FES) governance problems) as well as personal, continuous, and trusting cooperation in the IRs with local partners and stakeholders (i.e., real stakeholder inclusion and recognition). We have always been guided by the premise that the innovation work is not an end in itself of an artificially created project from Brussels, but must be based on the real needs and perspectives of the stakeholders themselves. Finally, it is about their real economic and forest-ecological existence, so InnoForEst is not just an abstract exercise.

What is crucial about applying the approach?

The InnoForESt approach has been designed to fulfil an Innovation Action[15]. The aim was, on the one hand, to initiate new governance innovations or to give existing ones a new boost, and, on the other hand, to develop and test prototypes of these innovations. This means that IF did not primarily conduct research for its own purposes, but employed research approaches and methods as a means to conceptually, methodologically, and empirically support actual ongoing innovation work 'on the ground'. The main tasks in the IF project thus revolved around coordination, assistance, reflection, and training. This deliverable also takes this primary set of tasks into account.

Coordination concerned the cooperation between the various IRs and the overall project as well as that between the work packages and the regions. Project meetings for mutual exchange had to be coordinated as well as the daily work and research with which the innovations were to be initiated and advanced. Assistance was the continuous support of the innovation efforts in the regions by those project members who led the research and the interactions with the stakeholders. Reflection revolved around making content and procedures that had emerged in one place and perhaps even proven to be available as ideas to the other partners. It should also enable a learning curve and contribute to replication and upscaling. In the course of this, it was also clear that a whole range of skills had to be carried into the broader project through training offers. Given the very heterogeneous disciplinary background of project members and the great variety of concepts and methods employed in the project, key training areas had to be reduced to a few common denominators, such as core approaches to preparatory research (on Governance Situation Assessment, Aukes et al. 2019/D5.1; on Stakeholder Analysis, cf. Schleyer et al. 2018/D5.2), carrying out strategic workshops (CINA approach, cf., Aukes et al. 2020a/D5.5), and documentation of the innovation work (cf. Aukes et al. 2020b/D4.2). This was considered crucial for the implementation of a consistent approach to stakeholder participation, prototype creation, and comparability of results.

Contribution based on Aukes et al. 2020/D5.4

Figure 4 The InnoForESt Approach

Structured, Facilitated Stakeholder Network Building

After the systematic stakeholder identification, the IRs went through a structured stakeholder network building process aimed at collaboratively developing (further) a governance mechanism suitable to spark innovations. The respective regional processes were initiated and accompanied by a team of scientists. They followed a particular method called 'Constructive Innovation Assessment' (CINA), which is based on a scenario-based methodology previously developed for assessing newly emerging technologies called Constructive Technology Assessment (CTA). A key element of CINA is developing alternative scenarios for different governance innovations and engaging all relevant actors together at an early stage. It entails a series of workshops, which allows for a continuous innovation development. One or more workshops focus on innovation analysis and visioning, prototype development, and road-mapping (see also Aukes et al. 2020/D4.2, Aukes et al. 2019/D5.1).

Certain key elements of this process were deemed particularly important by practitioners and were considered recommendable to other initiatives pursuing their own governance innovation:

[15] In HORIZON 2020 – WORK PROGRAMME 2018-2020 General Annexes, Section D. Types of action: specific provisions and funding rates, Part 19 – Commission Decision C(2017)7124, an Innovation Action is defined as "Action primarily consisting of activities directly aiming at producing plans and arrangements or designs for new, altered or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, piloting, large-scale product validation and market replication."

- **Taking time**; an effective stakeholder engagement process requires substantial amounts of time to accommodate identification of relevant stakeholders (see also paragraph above), as well as preparing, implementing, and following up on actual workshops and other meetings. If a series of meetings is implemented, leaving enough time to reflect on each event's developments and results is crucial.
- **Meeting in person and meeting regularly**; in-person meetings with and among stakeholders are described as a valuable opportunity to get to know stakeholders, their perspectives, challenges and needs, and for exchanging ideas. Organising multiple workshops and other meetings enables a comprehensive collaborative process of developing a common vision for the initiative, but also offers valuable time spans for the IR practitioners and scientists to reflect on the workshop outcomes. A series of meetings also allows for the necessary flexibility in terms of accounting for – or even integrating – newly emerging issues, or including additional stakeholders into the process.
- **Engaging external actors**; several IRs invited external speakers, or hired external moderators for one or more of the workshops. Their involvement was reported to have been beneficial to the innovation process and for stakeholder engagement. Having an external speaker present on a topic local stakeholders are interested in has served as a 'pull factor', and is thought to have attracted more participants to the workshops. Further, they often presented 'fresh' ideas, best practices, but also insights on challenges and failures, which informed the (further) development of the governance innovation under scrutiny. External moderation of discussions is reported to have benefited the workshop's quality and discussion results, too. Professional moderators have capacity, knowledge, and experience to plan and implement an effective workshop, or support non-professionals in their efforts. This includes providing practical guidance on tools, methods, and moderation techniques available to use in the workshop, for example, for structuring plenary discussions and group work, but also for documenting discussions and workshop outcomes in a non-academic, everyday language, as well as providing easy-to-follow guidance on workshop management to practitioners, including scheduling, timing, and reflecting on workshop outcomes.
- **Context knowledge and trust**: having continuity with regards to individuals involved in the network building processes and scenario development (see below) is essential. Those who have carried out preparatory research (e.g. stakeholder analysis etc.) and have built a level of trust through numerous discussions and meetings with stakeholders, play a key role in (CINA) workshops. They can contribute the familiarity with stakeholders and issues necessary for successful collaboration and mobilisation of workshop participants.

The InnoForESt multi-actor-approach

Had foreseen and proved stakeholders' engagement as key for exploring innovation potentials for governing FES sustainably and for putting them into use. The identification of practice-relevant problems and the perception of these problems, interests and demands, as well as the collaborative development of innovative and practice-relevant governance solutions are therefore highly dependent on the successful and comprehensive identification of and engagement with stakeholders in the IRs. To ensure a certain standard of stakeholder characterisation and governance context description and to allow for some comparability of results across IRs, the implementation of training approaches for preparing and conducting the Stakeholder Analysis and, later, the Governance Situation Assessment in the IRs was crucial. This enabled IR teams to gain implicit knowledge as well as identify knowledge gaps about stakeholders, institutional arrangements, and policies, and to help them gather new information that may support 'their' innovation processes.

Contribution based on Aukes et al. 2020/D5.4

Figure 5 The InnoForESt multi-actor-approach

Facilitated Innovation Development

Innovation is a social process within given cultural, scientific, technological, political and continuously changing context. It is not a straight-forward, linear process that can be programmed or would lead to precisely defined results, but is often experienced or observed as open-ended. In order to achieve anything, managers and policy-makers "are to go with the flow – although we can learn to maneuver the innovation journey, we cannot control it" (van de Ven et al. 1999: 213).
Based on this insight, CINA orchestrated a set of workshops with a range of stakeholders for (1) Innovation analysis and visioning; (2) Prototype development, and (3) Roadmapping (Loft et al. 2020/D4.3, Schleyer et al. 2020/D5.4). One major element of the CINA workshops is the development of scenarios with stakeholders. Both the process of working together to develop them as well as their actual content - the scenarios themselves - were identified by practitioners as key elements of the overall innovation [development] process; scenarios enabled a strong identification of stakeholders with the IR's goals, but also provided clear focal points for discussion and a goal for stakeholders to work towards during the workshops and other events and meetings. At the same time, developing scenarios – but also selecting and discarding them – enables finding stakeholders' "sore spots", as one IR practitioners put it, and thus helped to understand better what issues stakeholder are willing to negotiate, and which issues not.

Innovation Journeys

Building on corporate innovations research (Van de Ven et al. 1999, Kuhlmann, 2012) we adapted the concept of an 'innovation journey' to describe and analyse innovations as processes (see Loft et al. 2020/D4.3). Along a set of process event categories the innovation development was reconstructed. This encompasses the socially enacted interactions between our IRs as "niches", the established regimes as well as other socio-cultural, economic and political landscape developments and trends, against the background of which the more specific dynamics of particular regimes and niches evolve (Geels 2002; Geels and Schot 2007; Rip 2012).

With this co-evolutionary perspective on the innovation process and its context, we imagine innovation as a journey into uncharted waters and although we can learn to maneuver the innovation journey, it is important to realise that it cannot be controlled (van de Ven et al. 1999). In other words, innovation processes are not a matter of control, steering and management.
Our empirically grounded and theoretically informed conception of the innovation journey (Loft et al. 2020/D4.3) allowed us to capture the uncertain open-ended process by reconstructing precisely the open ends and uncertainties as well as the more or less organised social actions and negotiations, and to identify patterns and typical key components.

We found that innovation development does not take place in isolated space. It is influenced and influencing essential context conditions. For innovation development the strategic orientation, i.e, the overarching aims and objectives are essential. Real world innovation development does not take place under ideal "laboratory" conditions. Rather it is shaped by problems, crises, stagnation and setbacks. A closer look at the Innovation Journeys has revealed that (1) innovation processes have a rhythm, (2) which is very different depending on the local and historical situation in which it is embedded, (3) which is not simply going into the direction of the new, towards progress and (4) that stakeholder networks develop along with the rhythm of the innovation process. In addition, the role of the Constructive Innovation Assessment with its multi-phase approach became clearer.

Contribution based on Loft et al. 2020/D4.3

Figure 6 Innovation Journeys

Payment Mechanisms for FES Provision

The IRs involved in InnoForESt showcase a number of different approaches to funding FES provision: all actively address private economy mechanisms that contribute to securing the provision and financing of regulating and cultural FES. They range from crowdfunding (CZ: biodiversity), and sponsoring (SE), to communal forests and private enterprises involved in regional forest-wood value chains (SK, AT) and compensation (FI: biodiversity, DE: carbon emissions), and again others work with combinations thereof (IT).

The FES-related payment mechanisms and business models detected can be grouped into main three categories:

1. **Compensation payment mechanisms for forest management offsetting negative ES footprints:** Primarily direct payments for biodiversity conservation or carbon sequestration. Thus, forests no longer provide income (solely) based on their (timber) productivity, but rather through their ability to compensate for negative ecological and climate effects of other production processes elsewhere.
2. **Value added in regional forest-wood-value chains from multi-FES oriented forest management:** Timber production and processing of innovative wood-based products contributes to refinancing forest management decisions beyond provisioning FES.
3. **Business models of other sectors dependent on forests and their FES as a backdrop**.

So far, none of the IRs was yet able to establish a self-sufficient economically sustainable private market financing mechanism or business model for the provision of regulating and cultural FES. All developments are still ongoing and largely shaped by dynamic changes in context conditions, often being subject to policy changes. Most of the innovative payment mechanisms and business models currently implemented were found to be dependent – at least to some extent – on some form of public involvement, and are perceived to continue to do so in the future as well.

This public involvement can take different forms: for the documented compensation payment mechanisms, public entities are found to be intermediaries managing transactions between forest owners and customers willing to purchase offsets (FI); municipalities are one potential buyer of these forest ecosystem services, alongside companies. (FI); Municipalities also have the option to carry out the offset on their own public lands (FI) or the state forest administration provides public land for planting 'climate forests' by others and later maintains these reforestation sites (DE). Practitioners in CZ, FI conclude from their project experience that a government decision for obligatory compensation measures is needed to get compensation payment schemes well-functioning. Value-adding innovations in regional and diversified forest-wood-value chains are often supported by local public procurement (AT). Intersectoral innovative business models relying on forests and FES as a backdrop are currently designed and supported by non-profit organisations such as the tourism association (AT), educational organisations (SE), and non-profit NGOs, which again receive public funds. The objective to maintain forest–pastures with high levels of regulating and cultural FES plus related private business incentives in a mosaic of public-private land ownership (IT) hinges, among others, on the administrative capacity supporting stakeholder network building and on public funding being granted. All IRs and FES related innovation processes have reportedly benefited from public financial grants to non-profit NGOs and scientists providing goal-oriented systematic networking and methodological support within and beyond their local realm.

Cross case analyses on key factors influencing governance innovations

The process of factors identification and analyses has been defined for the identification and reconfiguration of key factors for innovative activities towards sustainable forest ecosystem service provisioning and financing developed in co-production of theoretical, expert and empirical knowledge. When the historical and current setting of governance innovations is known, strategies and policy recommendations can be developed to transform the innovation into the next desired future step, namely the next innovation stage or the next level application scope.

Theoretical knowledge on influencing factors is derived from the SETFIS analysis framework as described in detail in Sorge and Mann, 2018/D3.1. Initially, we identified 75 factors in 6 dimensions: the Governance System, including Actors and Institutions; the Biophysical Ecosystem; the Forest Management System; the Innovation System; the External Factors and the Governance Innovation Process. Those dimensions and their factors have been translated into questions for in depth interviews in all Innovation Regions. The results provided a detailed insight on the development of governance innovations, reduced the set of most influencing factors and exemplified dynamics between the factors. This helped us to better understand the innovation due to making certain processes and patterns of actors within the innovation process visible. This experience is shared and translated into recommendations to possibly not only improve (upgrade) and increase the level of applicability (upscale), but also to possibly reproduce such governance innovations into other regions with related contexts.

Following consultations with the representatives of IRs as part of CINA process and the InnoForESt consortium, 40 most relevant factors were selected and finally validated in an online survey answered by 17 representatives of IRs.

In a final step of the analysis we linked the identified influencing factors with potential innovation trajectories to identify smart innovation patterns and road mapping strategies, and for the derivation of policy and business and management recommendations.

Table 2 demonstrates the 17 most important factors for sustainable ecosystem services governance innovations. The level of importance of each factor was assessed on the scale from 1 to 5 (Most important = 5, Least important = 1), finding an average score of 4 or higher).

The results of factors analyses (Table 2) indicate a possible grouping of factors into three clusters referring to i) institutional robustness of forest communities ii) local biophysical conditions and policy support (such as FES as economic model) and iii) innovation friendly behaviour (proactive payments for ecosystem services, social economy). These can create a basis for smart innovation patterns that are now being developed.

Moreover, further results from the factors analyses indicated impact of relevant policies at different governance levels on innovative activities. A majority of respondents from IRs identified local and EU policies as the most enabling or fostering policies for their innovations for sustainable FES provision. On the other hand, national policies are seen as the most hindering for IRs activities and a majority of respondents demand their change/redesign (similarly for regional policies which, however, were perceived much more positively).

Contribution based on Kluvankova et al. 2020/D3.2

Figure 7 Cross case analyses on key factors influencing governance innovations

Table 2 Validation of the most influencing factors by IRs' representatives

Factor	Factor validation (average)	Factor assessment (prevailing)
Strong leadership/leading group/intermediary	4,65	Fostering
Network collaboration	4,41	Fostering
External social/political influence	4,35	Fostering
Sharing information	4,29	Fostering
Communication on forest ecosystem services and their contribution to human wellbeing	4,29	Fostering
Innovation-friendly environment	4,24	Fostering
Impact of the innovation on forest ecosystem services provision	4,24	Fostering
FES Demand	4,24	Fostering
Flexibility of application scope	4,24	Fostering
Sharing knowledge & training	4,24	Fostering
Flexibility and openness to include new actors	4,18	Fostering
Policy Support	4,18	Fostering
External economic influence	4,18	Hindering
External support	4,12	Fostering
External biophysical influence	4,12	Fostering
Related innovations	4,06	Fostering
Influence of local orientation	4,00	Fostering

Legend: Assessment of relative importance of influencing factors: 1 = Strongly disagree; 2 = Disagree; 3 = Neither disagree nor agree; 4 = Agree; 5 = Strongly agree.

Source: InnoForESt Factor Assessment Survey in Kluvankova et al. 2020/D3.2

The following recommendations and options for action to develop functioning private, market oriented payment mechanisms for the provision of FES reflect one or more of the above described overarching themes; the role of each of the six targeted actor (groups) - forest owners and managers, NGOs, entrepreneurs, local policy-makers, national and EU policy-makers, scientists and entities funding future research - can play regarding any one of these themes depends on the actor group's particular position, resources, and expertise (see also Table 2). They were written with the aim of concise recommendations that provide readers with all necessary information and hints to further information, independently of reading the entire report. A certain level of redundancy across the individual recommendations is a necessary trade-off to this "stand-alone approach".

Table 3 Overarching themes and targeted actor groups

Actor groups[16] addressed -> ---------- Overarching themes	**Forest owners/ managers / administrations**	**NGOs & Associations**	**Entrepreneurs**	**Local policy-makers**	**National and EU policy-makers**	**Scientists**
Maintaining direct link to FES provision	Pro-active	Pro-active	Pro-active	Pro-active	Pro-active	Pro-active (methods)
Bringing diverse stakeholders together	Pro-active	Pro-active	Pro-active	Creating supportive conditions	Creating supportive conditions	Creating supportive conditions (methods)
Structured, facilitated network building	Participating	Pro-active	Participating	Creating supportive conditions	Creating supportive conditions	Creating supportive conditions (methods)
Facilitating Innovation development process	Participating	Pro-active	Pro-active	Creating supportive conditions	Creating supportive conditions	Creating supportive conditions (methods)
Payment mechanisms for FES provision						
- direct compensation scheme	X	X	(X)	X (public support)	(X) (regulations, public support)	X (evaluation, monitoring)
- indirect from timber-based value chains	X	-	X	X (public support)	(X) (regulatory conditions, public support)	X (product & chain dvlp.)
- income from non-sectoral economic activities based on FES	(X)	X	X	X	(X)	X

Legend:
X = InnoForESt has identified a potential role for this actor in the context of the respective overarching theme
(X) = perceived potential role without examples within InnoForESt
- = InnoForESt has not identified a role for this actor in the context of the respective overarching theme

[16] Actor (groups) refer to those actors for which targeted recommendations are provided here. They include: Forest owners, NGOs, entrepreneurs, local policy-makers, National and EU policy-makers and scientists to which we are addressing the recommendations.

2.1 Forest owners and managers

Forests across Europe are owned and managed by various types of forest owners, primarily public forest owners on national, state, communal, and local levels, as well as private forest owners, typically differentiated into large- and small-scale owners. Management activities are carried out either by the private owners themselves, co-operatives, contracted entrepreneurs, or – mainly on public land – the forest administration. The proportion of public vs. private, large vs. small forest ownership varies across Europe, as do forest types and management objectives. Nevertheless, forest owners do share similar challenges when it comes to financing the provision of FES. In brief, it is becoming increasingly difficult to generate profit based on the production and sale of timber due to unsustainable global markets for forest products, climate change, etc. At the same time, societal demands towards forests are growing and becoming more diverse, including for biodiversity conservation, recreational opportunities, and using forests as carbon sinks. Forests provide a range of FES and can be managed to provide a particular (set of) FES in greater quality and or quantity. Yet forest owners typically do not receive (sufficient) reimbursement or financial support especially for the regulating and cultural ecosystem services their forests provide, to incentivise management activities that would maintain or increase their supply (see Figure 1). As a result, despite high societal demand, many non-provisioning FES tend to be underprovided or even decrease because those able to provide them – forest owners and managers – thus far do not receive sufficient compensation.

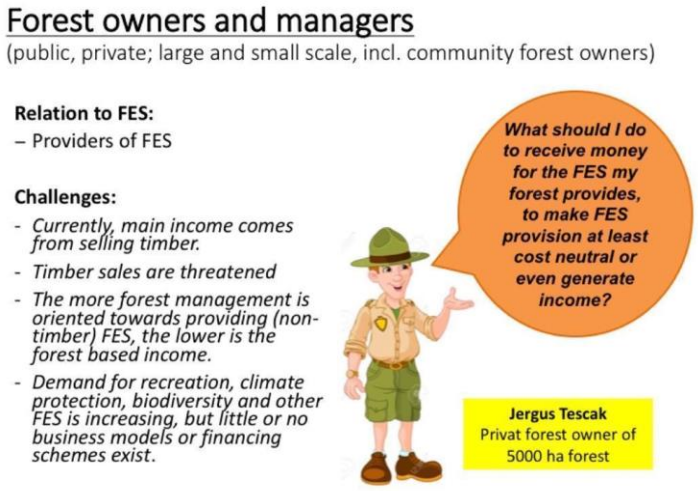


Figure 8 Forest Owners - Persona

Maintaining direct link to FES provision and financing

When collaborating with other stakeholders, forest owners and managers play a key role in making sure the link to forest management and FES provision and financing as well as other FES-related objectives are considered throughout the innovation development process. Recommendations include to:

- contribute your forest-related knowledge to discussions about FES provision and financing or their role as backdrop for other economic initiatives.
- collaborate with suitable organisations to assess the current supply and demand of FES in your region, and evaluate the quality and quantity of FES currently provided as well as the potential for improvements including necessary measures to take.
- request an assessment of any innovation process concerning the potential for improvements or potential negative impacts in quality and quantity including necessary monitoring measures to be taken.
- ensure that agreed upon objectives are clear in terms of their desired impact on FES provision, and that their implications for forest management and on (opportunity) costs are acknowledged. Governance innovation's impact on FES can vary significantly. This entails continuously thinking through and voicing forest management implications and the expected or potential (positive and negative) impact on FES provision as innovative governance and business ideas are being developed.

In this context, forest owners and managers are further recommended to:

- Lobby for greater recognition of the broad range of FES their forests provide, particularly relating to regulating and cultural ecosystem services. This can be achieved, for example, by contacting organisations that represent forest owner's interest at a policy level, or local political representatives to lobby for greater recognition of FES with other sectors.

Bringing diverse stakeholders together

Forest owners and managers are key actors when it comes to FES provision, yet – unless becoming a trans-sectoral entrepreneurs themselves - they are typically dependent on the collaboration with others to realise a financial return for the products and services their forests provide. First and foremost, they need support in identifying potential customers or buyers of FES, or a source of funding for changes in forest management. Getting to that point usually requires networking with various and diverse actors. One recommendation to forest owners is thus to reach out and discuss FES-related aims with:

- other like-minded forest owners
- already established initiatives aiming to sustain FES provision and financing
- local forest-related businesses
- local forest-/FES-related NGOs & associations
- local forest administration

Identifying and reaching out to other forest owners, as well as already established initiatives aiming to sustain FES provision and financing is a crucial first step. Groups of like-minded forest owners are more likely to be effective in their endeavor as they represent more forest land, thus more – and possibly more diverse – FES can have a greater impact on FES provision in a region, but are also better positioned to develop funding ideas together, spread the word, and lobby for their mission.

It is just as important to network with the "unusual suspect": New potential partners to reach out to include non-forest actors, such as NGOs, academia, and/or or (local) businesses.

Reach out to and collaborate with, for example,

- NGOs with a focus on environmental and/or rural development issues
- Eco/nature-tourism services or entrepreneurs
- scientists from forestry and non-forestry fields

Any of such organisations may be able to support those forest owners and managers along the way of network building, who would not be able to accomplish this on their own. The necessary first steps include conducting a strategic and systematic stakeholder analysis, connecting with already existing initiatives and learning from their experience, actively identifying and reaching out to new, potentially FES-interested actors, and facilitating stakeholder network building processes locally (see also recommendations to these actors in sub-chapters 2.3, 2.4, 2.7 to get a sense of what they may be able to do for forest owners, as well as sections on "facilitated stakeholder network building" and "Maintaining direct link to FES provision and financing" in chapter 2).

Working towards new solutions for FES provision and financing may also mean placing existing forestry knowledge and expertise in a new context, for example to put forestry knowledge and machinery to use for forest restoration activities and rural development projects. Public forest administrations can benefit from reaching out to these actors as well, though they are also in a position to take an active role in advancing FES provision as a management goal among private forest owners. Large-scale forest owners, as well as public forest administrations may be able to initiate networking activities for example, among private forest owners, further interested landowners, local policy-makers, and other stakeholders. In addition, they can tap existing cross regional networks such as Pro Silva, EUSTAFOR, forest certification schemes (e.g. FSC or PEFC) etc., for networking activities. On the one hand, such extended forestry networks may offer opportunities to learn about FES-oriented initiatives elsewhere. On the other hand, when collaborating with actors outside the forestry sector, forest owners play a key role in making sure the link to forest management and FES provision is considered throughout. Strategic systematic stakeholder identification plays an important role in the success of stakeholder network building processes and related meetings. It is recommended to:

- Identify existing networks and get involved in existing forest-/FES-related networks (see also recommendations for NGOs & associations 2.3). The methods and tools for stakeholder analysis outlined in Sattler 2019/D4.1, Aukes et al. 2020/D4.2, Aukes et al 2019/D5.1 can help guide this process. Even if existing networks do not yet address the provision and financing of FES directly, your active participation may spark a new line of thought and innovation processes.
- If no relevant networks exist, identify like-minded colleagues and cooperate with an organisation experienced in network building, such as NGOs, research organisations or specialised providers to build one. When doing so,
    - encourage a systematic and well-tested stakeholder identification and involvement process with an underlying concept (e.g. CINA, see Sattler 2019/D4.1, Aukes et al. 2019/D5.1 and Schleyer et al. 2018/D5.2 for more details on stakeholder identification and methods used in the InnoForESt context).

Structured, facilitated stakeholder network building

Working together toward a shared aim, mutual learning, and common achievements were identified as key helpful elements by practitioners in the strategic stakeholder network building. Alas, forest owners and forest managers were found to be unevenly represented in the different IR stakeholder networks and activities. Recommendations to forest owners and managers are to:

- work with experienced moderators to conduct workshop(s).
- (co-)organise and invite to a series of meetings, not only one, with different topics and objectives to continuously engage network members and – if need be, e.g. to fill gaps in knowledge – attract new stakeholders.
- encourage the use systematic and well-tested workshop designs to strengthen and activate your network (see Sattler 2019/D4.1, Aukes et al. 2020/D4.2, Aukes et al. 2019/D5.1 and Schleyer et al. 2018/D5.2 for more details on workshop methods used in InnoForESt).
- invite external speakers with presentations about attractive related issues and best practice examples to increase stakeholder participation and to inform discussions and decisions on options and scenarios.
- If you are an invitee, actively participate in the workshops and scenario development process. This presents an opportunity to contribute forestry knowledge to the discussions and help ensure a clear connection between the scenarios developed and FES provision and financing (see also next section).

Facilitated Innovation development

Promising innovation development processes for new products, services, and Payment mechanisms have been initiated or enhanced in InnoForESt's IRs following the CINA workshop methodology. One major element of the series of CINA workshops is the collaborative development of scenarios with relevant stakeholders. Both, the process of trans-sectoral cooperation developing these scenarios as well as the actual content - the scenarios themselves - were identified as key helpful elements by practitioners in the overall innovation development process. Alas, forest owners and managers were found to be unevenly represented in the different IR networks and activities. Resulting recommendations to forest owners and managers are to

- work with experienced moderators from NGOS, academia, government entities, or professional providers to conduct workshop(s) (see also recommendations to these actors).
- encourage the use systematic and well-tested workshop designs fostering governance innovations; in InnoForESt, workshops followed the so-called CINA workshop method (See Sattler 2019/D4.1, Aukes et al. 2019/D5.1 for more detail).
- encourage and support moderating entities to use scenario-development method (see Aukes et al. 2020/Del. 5.5 for more details).
- (suggest) external speakers to invite with presentations about topical issues related to particular scenarios to increase stakeholder participation.
- actively participate in and contribute to the scenario development process, whether as co-organiser or invitee. This presents an opportunity to contribute forestry knowledge to the discussions and help ensure a clear connection between the scenarios developed and FES provision and financing.

Payments for FES provision

Direct compensation schemes

The IRs in InnoForESt's considering compensation schemes found those promoting regulating FES most promising. They are of particular interest to forest owners and managers who are looking to receive financial compensation for managing their forests for regulating FES. While none of these schemes have yet proven their economic sustainability in the long term, our findings do allow for preliminary conclusions and recommendations:

- Evaluate to what extent your forest and your forest management is suitable or adaptable to provide a balance of regulating, cultural, and provisioning FES. Partner with forest sector experts, academia, or NGOs to conduct such analyses.
- Learn about the design of promising voluntary compensation schemes, for example, by the Habitat Bank in Finland and Waldaktie in Germany (Aukes et al. 2020/D4.2, Maier and Grossmann 2019/D6.2).
- Use a scenario-method to decide which type of regulating and/or cultural FES you would like to intensify in your forest management scheme, and whom you would need as collaborator (see e.g. Aukes et al. 2020/D4.2, Aukes et al. 2019/D5.1).
- Look for and partner with NGOs implementing a voluntary compensation scheme for biodiversity, carbon sequestration or other FES to see whether you can participate (for example, by checking out this map https://sincereforests.eu/innovation/innovation-inventory-map/).
- research other ongoing initiatives involved in crowdfunding compensation payments for other types of land management oriented to preservation and restoration of ecosystem services in your region, federal state, or country, for example, (forest) species conservation, preservation of open cultural landscapes, and peatland restoration.

Indirect finances through timber-based value chain

Timber production and processing can contribute to securing regulating and cultural FES if certain conditions are met. For example, processing autochthonous hardwoods may support or even trigger forest conversion into more resilient mixed forests, while also supporting rural economic development. Hence it is recommendable to

- analyze the role timber production, certain timber species, and product development, in particular with autochthonous hardwoods, can play in the larger context of FES provision.
- contact regional wood processing businesses to explore options for collaborating on a wood-based product that also benefits FES provision and financing.
- gather information about ongoing rural development programs involving wood processing or forestry to identify options for getting involved.

Income from non-sectoral economic activities based on FES

Other mechanisms analysed in InnoForESt involved mainly working with tourism associations offering forest-based health and wellness experiences as well as private entities offering educational events in and about forests. While these offers have not yet provided (much) direct financial benefit to forest owners, they indicate a growing societal demand for such offers. Hence, there may be economic opportunities for refinancing the provision of regulating and/or cultural FES for forest owners in the future.

Thus, the recommendations are to:

- consider the possibilities of providing forest-based health and educational offers, possibly in collaboration with other organisations, such as NGOs, tourism associations, or independent entrepreneurs in the outdoor recreation sector.
- negotiate with FES-reliant service providers to receive a percentage of the revenue generated through activities taking place in your forest.
- collaborate with suitable organisations to assess the current supply and demand of FES in your region, as well as the potential for improvements in quality and quantity including necessary measures to take.

2.2 Non-governmental organisations (NGO) & associations

Non-governmental (NGO) organisations were found to fulfil important intermediary functions that support diverse actors in developing new mechanisms to secure FES provision and financing at a local level. In addition, InnoForESt findings point to a role for NGOs and associations working to represent forest owners (e.g. EUSTAFOR for state forests, ELO for private forests) and other FES related interests (e.g. nature conservation, recreation) at the policy level in decision-making processes surrounding the future FES provision and financing. In particular organisations working in the field of rural economic development, but also nature conservation, climate change mitigation and resilience, education and others may find that the objective of FES provision and financing complements their core mission well and offers synergies. Because the roles NGOs and associations may fill in an FES governance innovation development process can be similar, and at times overlap, the recommendations below do not distinguish between the two types of organisations.

NGOs are able to provide different types of support and services, esp. in comparison to entrepreneurs or administrations, depending on the organisation's profile and mission. In some cases, they can even be forest owners, and thus providers of FES themselves (See e.g. IR CZ in Aukes et al. 2020/D4.2, Maier and Grossmann 2019/D6.2). While the diversity of NGOs in terms of their size, scope, and mission cannot be covered here, recommendations can be differentiated to a certain extent. NGOs can support securing FES provision and financing either by integrating this objective into their mission, or by specialising in providing support for organisations and initiatives trying to do so such as conducting a stakeholder analysis to facilitate network building processes, contributing experience in non-profit engagement and financing, and providing subject-related consultation services.

Figure 9 Non-governmental organisation – Persona

The principal recommendation is to develop an understanding of how FES provision aligns with your organisation's mission and what skills and resources you are able to contribute to an innovation development process that aims to secure FES provision and financing in the future. Based on InnoForESt's experience, NGOs and associations are frequently well equipped to take an intermediary role and become active in network building processes as well as innovation development.

Maintaining direct link to FES provision and financing

Particularly NGOs active in the fields of rural development and nature conservation, but also those targeting climate change mitigation and resilience, may find that FES-related objectives fit well into their existing networks and mission and may ultimately result in win-win situations. As the innovation processes are found to be complex, stakeholder dependent, and often winding over longer time periods, it is important to consciously establish and maintain a direct link to FES provision and financing throughout the process. Based on InnoForESt's experiences and insights, recommendations to NGOs are to:

- Reflect on existing and potential interconnections between your organisation's own mission, your innovation related goals, and FES provision.
- within your stakeholder network, collaboratively develop ideas and scenarios for integrating the provision and financing of FES into ongoing efforts and innovation processes.
- Realise positive potentials through
    - a conscientious effort to include actors from the forest sector
    - continuous consideration of implications on forest management
    - expected positive but also potential undesirable impacts on FES

InnoForESt findings indicate that broadening an organisation's mission to also directly address provision and financing of FES can be challenging (See Aukes et al. 2020/D4.2).

Another role and mission an NGO may thus take up is to provide FES-related consulting services to other NGOs, to (forest) practitioners, entrepreneurs, and other interested parties. To do so successfully, recommendations are to:

- cultivate in-depth expertise on both the ecological and socio-economic aspects of securing FES provision.
- work directly with other interested NGOs to identify potentials for integrating FES provision and financing into the organisation's current mission.
- offer training and knowledge transfer addressing FES oriented forest management to interested forest owners, administrations, and associations.
- offer FES assessment and monitoring including:
    - quantity and quality of FES provided
    - the societal demand for particular FES
    - the economic opportunities associated with their provision
- support [preparatory measures for] participation of different stakeholders in existing certification schemes.
- build an information hub (virtual and in person) for interested parties on FES-related developments, including concise and digestible communications on:
    - policy level developments, for example, related to the EU Green Deal
    - best practice examples
    - upcoming events and excursions
    - check lists for decision taking processes
    - funding opportunities for FES-related trans-sectoral innovation and implementation projects

Bringing diverse stakeholders together

NGOs are found to often have diverse stakeholder networks spanning from local to national or international levels. InnoForEST has worked primarily on building local stakeholder networks to develop innovative governance mechanisms for FES provision and financing. Thus, the following recommendations apply primarily to similar efforts:

- Conduct a structured stakeholder identification process (see also Sattler 2019/D4.1, Aukes et al. 2019/D5.1,). Start with a systematic assessment of potentially relevant stakeholders considering cultural, economic, and historical aspects relating to your vision.
- Sketch a map of existing collaborations and active networks, projects and initiatives; identify which actors could become a driving force in the initiative, which could be interested, and which actors are currently missing in the network.
- Reach out to and engage all potentially relevant actors, particularly forest owners and managers. They are key figures as their land, influenced by their management decisions, is providing FES.
- Reach out to and collaborate with non-forest sector actors, who share an interest in FES provision and are able to contribute expertise, staff and or financial resources, to support the innovation development process:
    - other NGOs with a focus on environment, or rural development
    - eco/nature-tourism services or entrepreneurs
    - scientists from forestry and non-forestry fields, for example, from your nearest University or research station

Structured, facilitated stakeholder network building

InnoForESt's experience indicates that a series of workshops with systematic and well-tested designs and an underlying clear concept can play an important role in the success of stakeholder network building processes and related meetings. It is recommended to:

- Use systematic and well-tested interactive workshop designs to strengthen and activate your network (e.g. CINA, see Sattler 2019/D4.1, Aukes et al. 2020/D4.2, Aukes et al. 2019/D5.1 for more details on workshop design and methods used in the InnoForESt context).
- organise and invite to a series of meetings, not only one, with different topics and objectives to continuously engage network members and continuously attract new stakeholders.
- moderate these meetings yourself or work with experienced moderators, e.g. from other NGOS, academia, or professional providers to do so.
- Invite external speakers with presentations about attractive issues related to your FES objectives to increase stakeholder participation and offer excursions on related topics. These incentives were found to attract more stakeholders to participate and keep them interested and engaged in the innovation process.
- Include local actors with a long history and familiarity with the issues at hand and the stakeholders involved. Involve them in preparatory steps such as stakeholder analysis and workshop planning. Having trusted actors involved throughout can be an asset to the network building process.

Facilitated Innovation development

Promising innovation development processes for new products, services, and payment mechanisms have been initiated or enhanced in InnoForESt's Innovation regions following the CINA workshop methodology. One major element of the series of CINA workshops is the collaborative development of scenarios with relevant stakeholders. Both, the process of trans-sectoral cooperation as well as the actual output - the scenarios themselves - were identified as a key helpful element by practitioners in the overall innovation development process. The recommendations to NGOs acting as intermediaries or moderators of innovation development processes for FES provision and financing include:

- perform the whole series of CINA workshops to activate your network toward innovation development (See Aukes et al. 2020/D4.2, Aukes et al. 2019/D5.1, Aukes et al.2020/D5.5) for more details on workshop design and methods used in the InnoForESt context).
- if restricted to perform only one strategic innovation workshop, choose the one preparing and organising the collaborative development of scenarios with relevant stakeholders (see Sattler 2019/D4.1, Aukes et al. 2019/D5.1).
- work with experienced moderators from NGOS, academia or government entities to implement the workshop(s) (see also recommendations to these actors).
- encourage and support moderating entities to use the scenario-development method (see Sattler 2019/D4.1, Aukes et al. 2019/D5.1, for more details).
- Invite external speakers with presentations about topical issues to increase stakeholder participation.
- encourage active participation by a diversity of stakeholders in the scenario development process. This process is an important opportunity to ensure a clear connection between the scenarios developed and FES provision and financing (see also next section).

Payment mechanism for FES provision

Direct compensation schemes

The FES found most attractive for direct compensation schemes were related to biodiversity conservation and carbon offsetting. Several IRs involved in InnoForESt have focused on the sale of voluntary certificates for the provision of these FES (CZ/SK, FI, DE). Exemplary schemes initiated before InnoForESt have had some success at securing the provision of FES in their particular region, but they have not yet been economically viable long term (CZ/SK, DE). Other elaborated compensation schemes developed accompanying administrative management concepts (FI), but were not yet able to contractually engage private parties on both sides (funders and providers of regulating FES oriented forest management). In all cases it is concluded that direct FES compensation schemes depend on existing supportive national policy or future policy changes. Given suitable conditions, direct compensation schemes may become a key tool for securing FES provision. Therefore, NGOs interested in developing a payment mechanism are recommended to:

- analyze the institutional setting forest management for FES is embedded in your particular country to understand the legal frame conditions for access to and management of FES and related business development, to allow for national and regional specificities and alternatives.
  InnoForESt has produced a virtual map visualising the political strategies and institutional environment influencing FES in many European countries. This may be a first starting point for exploration of institutional frame conditions assess the current supply and demand for different FES in your region to make an informed decision which FES to focus on; possibly cooperate with academia, other organisations and/or use well-tested methods to do so on your own.
- reach out to existing compensation schemes to learn about related forest management standards.
- identify and reach out to other initiatives with a similar objective to benefit from their experience and lessons learned, for example, regarding the price setting and transaction management.
- collaborate with forest owners and potential buyers to select and adapt a suitable existing, or design and develop a new voluntary payment scheme (see Sattler 2019/D4.1, Schleyer et al 2018/D5.2, Aukes et al. 2020/D5.5 for for information on workshop design and methods, see Aukes et al. 2020/D4.2 for information on the Habitat Bank in IR FI)
- identify and reach out to forest owners and potential buyers willing to participate in a voluntary compensation scheme.
- for larger contracts consider
  - public – private partnerships, for example, municipalities as buyers of FES certificates as much as
  - private-private partnerships with larger companies and individual or groups of forest owners
  - long term contracts with options to step out
- for crowdfunding concepts consider
  - addressing local people and institutions as well as
  - visitors/tourists
  - short term certificates (e.g., 1 year) with institutionalised offers of extension, for example, subscriptions with automatic extension until it is cancelled or formalised regular invitation to rebuy the certificate

The sections on IRs DE, CZ, FI in Aukes et al. 2020/D4.2 and Maier and Grossmann 2019/D6.2 offer insights on their compensation schemes. Once established, non-profit NGOs are well equipped to manage a voluntary compensation scheme, i.e. marketing it and actively managing transactions between providers and buyers of voluntary FES certificates as part of a (voluntary) compensation scheme.

Indirect finances from timber-based value chain

Strengthening timber-based value chains has long been an objective of rural development organisations. Integrating FES provision into this mission is possible when the forest management the value chain is based on, has a proven positive effect on FES provision. NGOS working in the field of rural development are recommended to explore options of integrating FES objectives into their mission. As illustrated by InnoForESt experience, it is crucial to critically reflect on a timber-based value chain in FES provision (see also 'Maintaining a link to FES').

Income from non-sectoral economic activities based on FES

FES can serve as a backdrop to a number of economic activities such as educational or recreational activities offered in the forest. Nevertheless, the revenue generated can help cover NGOs operating costs while raising awareness of their mission. Examples include educational tours through the forest, accommodation offered to tourists in the forest, and recreational activities such as forest bathing. Promising examples found during InnoForESt are acknowledged to contribute to job creation, new income opportunities and rural development. Alas, they were not found to directly redirect part of their income to forest managers to secure the continued provision and financing of FES. NGOs are therefore recommended to:

- assess the demand for FES-based activities and develop a corresponding offer to meet the demand.
- involve the forest owners on whose land these activities are going to take place from the very beginning.
- come to an agreement with forest owners about the use of the forest and division of the revenue generated.

Consider applying for financial support of your activities with public and private donors and programs that fund rural development and FES related projects such as LEADER, INTERREG, together with your stakeholders. Finally, NGOs are recommended to

- apply for public funding in related programs to finance the suggested activities together with suitable partners and consortia.
- use their networks and connections to policy-makers for the purpose of lobbying for greater recognition of the need to support efforts aiming to secure FES provision and financing.

2.3 Non-sectoral Entrepreneurs

Entrepreneurs from in- and outside the forest sector are key figures of interest when looking for innovative private market mechanisms to secure FES provision and financing. In this section, we address mainly entrepreneurs from outside the forest sector. Forest owners and managers have been addressed as a targeted actor group of their own; nevertheless, they may benefit from additional information provided here if they choose to act as entrepreneurs.

As demand for forest-based offers is growing, opportunities for entrepreneurs to develop new business model opportunities are increasing as well. However, InnoForESt findings suggest that developing a sustainable private business model around FES provision is challenging. They further indicate that there is a need to differentiate between business activities that may contribute to the future FES provision rather directly, and others that rely on FES as a backdrop without contributing to securing their future provision. For example, innovative products made of autochthonous hardwood - a provisioning FES – rely on a forest management that also fosters regulating FES - in this case (IR AU) enhancing forest biodiversity and climate resilience. Refinancing effects can occur if the business model (eventually) operates at a scale large enough to impact forest management decisions and generates additional revenue for forest owners. Other non-sectoral business models develop offers taking place in forests with FES as a backdrop, yet they do not contribute to financing their future provision by forest owners and managers.

Most innovative private business models analyzed in InnoForESt fit the latter category. They were designed either by non-profit organisations or public entities. Together with 'their' stakeholders they managed to create new jobs, new income opportunities for freelancers, or additional income opportunities for people already economically involved in regional forest-wood-value chains and tourism. The innovations include touristic offers based on experiencing the forest, such as educational tours, participation in tree planting and reforestation, but also health and culinary-oriented services, such as forest bathing and new FES-based consumables. So far, income generated through this type of activity is rarely shared with forest owners, the providers of FES, though it may complement a forest owners' income if he or she is directly involved in providing the service, or received fees for using their forests for business activities conducted by others. In both cases it does not provide sufficient financial return to incentivise the enhancement of non-wood FES.

With increasing political support for FES provision - for example, in the form of obligatory compensation measures - the need for FES-related consulting and FES compensation certification schemes will increase. These services are currently, including in InnoForESt, performed by NGOs or scientists. Turning them into a profitable business is in large parts dependent on future political developments. They may increase demand and business opportunities related in particular to the above described consulting services and the management of compensation mechanisms. Entrepreneurs interested in engaging in these kinds of business activities are referred to the recommendations outlined for non-profit NGOs (see recommendation to NGOs).

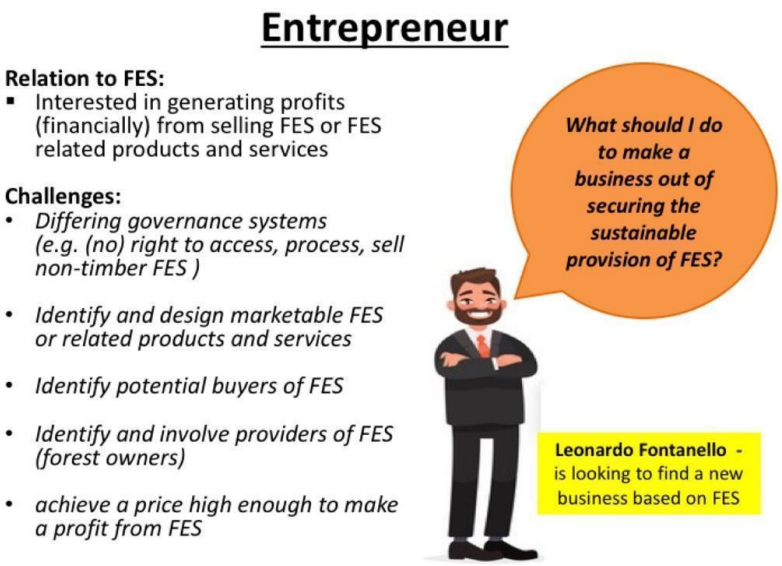


Figure 10 Entrepreneur – Persona

The principal recommendation is to develop a clear vision of what you would like to achieve in terms of innovative approaches to FES provision and financing. Based on this vision the following five overarching themes should be addressed.

Maintaining direct link to FES provision and financing

For business models relying on FES as a backdrop, the contribution to their future maintenance is largely limited to raising awareness of their importance. New cooperation models and contracts are still to be developed together with forest owners to acknowledge their contribution to the new extra-sectoral business models and to contribute financially to the maintenance and enhancement of FES in the region.

For new products and business models within the regional wood-based value chain, market prices for the timber or wood based biomass should remunerate forest owners and managers for their FES provision.

To increase these potentials it is recommended to:

- include benefits of regional products from sustainable multi-functional forestry in marketing.
- highlight arguments of regional development.
- assure good quality for reasonable prices to be better able to compete with international markets.
- collaborate with forest owners and managers to understand what the envisioned business activities mean for forest management decisions.
- come to an agreement with forest owners about the use of their forest and division of revenue.

Bringing diverse stakeholders together

Aspiring entrepreneurs pursuing an FES-based business model are recommended to identify, reach out to and work together with potential:

- clients
    - private customers
    - municipalities and other organisations relevant for public procurement
- cooperation-partners
    - in the forest-based sector along the value chain
    - Tourism and recreation service providers
    - Producers of regional products
- mediating agents and network coordinators, for example,
    - NGOs with related missions, esp. rural development (see also recommendations to NGOs)
    - Tourism agencies for forest-based recreational and health offers
- forest owners and managers, given that forests are the backdrop of the envisioned activities
- relevant research institutes and scientists in product and service development

Structured, facilitated stakeholder network building

Entrepreneurs have not been identified as key players in structured facilitated stakeholder network building. We recommend that you inform yourself about existing related networks and facilitators (see stakeholder identification, and section addressing NGOs) and actively engage in these networks. Your vision may spark new and helpful co-operations in your region.

Facilitated innovation development

Entrepreneurs are key players in innovation development. Individuals and their companies were found to be very creative and resourceful. Most positive examples identified by InnoForESt were based on specific local frame conditions, very individual ventures, challenges, and intrinsic motivations. Entrepreneurs participating in InnoForEst reported benefiting directly or indirectly from structured facilitated innovation development provided by regional facilitators like local NGOs or InnoForESt as an international publicly funded and pro-active innovation project.

The potential for upscaling and direct replication of exemplary private business innovations was evaluated as limited, but a comparative assessment of existing frame conditions concerning the suitability for uptake and adaptation of general ideas and concepts in other regions and countries is considered a worthwhile endeavor.

When developing an FES-based business model, aspiring entrepreneurs are recommended to:

- research local institutional and ecological conditions surrounding FES, (See Primmer et al. 2019/D2.1 and Varumo et al. 2020/D2.3) including an assessment of the current supply and demand for different FES.
- follow a structured (product) innovation development process. The methods used in InnoForESt may serve as a navigator and manual for its use (Aukes et al. 2020/D5.5).

- identify FES-related networks and facilitators (see stakeholder identification and the section addressing NGOs) and actively engage in these networks to meet like-minded innovators, and potential partners. Also your vision may spark new innovation processes in your region.
- inform themselves about existing innovative FES based product and service developments in other countries and regions.
- asses their potential for uptake and adaptation to local frame conditions
- consider new niche and regional markets based on FES.
    - innovative products made of autochthonous timber species, esp. hardwoods
    - technical innovations for and revival of wood based traditional architecture
    - wood based constructions for public buildings
    - forest related (eco-)tourism, recreation, education, and health offers
- select and address specific customer groups (individuals and groups) for different offers such as:
    - public administration
    - families
    - schools (classes) and other educational institutions and tour operators
    - individual service oriented wellness and eco-tourists

Payment mechanisms for FES provision

Direct compensation schemes

The compensation schemes developed as part of InnoForESt consisted of voluntary contributions to offset biodiversity or carbon footprints. They were not set up to generate revenue.

Indirect finances from timber-based value chain

For new products and business models within the regional wood-based value chain, market prices for the timber or wood based biomass are expected to remunerate forest owners and managers for their FES provision. It is found to be not always the case. To increase the potential to increase income based directly on the provision and use of FES it is recommended to:

- include benefits of regional products from sustainable multi-functional forestry in marketing.
- highlight arguments of regional development.
- assure good quality for reasonable prices to be better able to compete with international markets.
- collaborate with forest owners and managers to understand what the envisioned business activities mean for forest management decisions.

Income from non-sectoral economic activities based on FES

For business models relying on FES as a backdrop, the contribution to their future maintenance is largely limited to raising awareness of their importance but do not directly ensure their continued provision and financing, such as educational or recreational activities offered in the forest. New co-operation models and contracts are still to be developed together with forest owners to acknowledge their contribution to the new extra-sectoral business models and to contribute financially to sustainable management of FES in the region.

To increase these potentials, it is recommended to:

- identify levels of supply and demand for particular FES in a region.
- research similar businesses to learn from their experiences.
- include benefits of regional FES from sustainable multi-functional forestry in marketing
- highlight arguments of regional development.
- collaborate with forest owners and managers to understand what the envisioned business activities mean for forest management decisions.
- come to an agreement with forest owners about the use of their forest and division of revenue.

2.4 Local-level policy-makers

Local policy-makers can take on different roles in the context of securing the future provision and financing of FES, including that of a network building facilitator, a forest owner providing FES, or a purchaser/ consumer of FES-based services and products. As demonstrated by InnoForESt's IRs, local or regional administrations can even offer innovative FES-related services themselves, such as forest-based recreation (AT) or reforestation for carbon sequestration on publicly owned land (DE). Which of these roles are available to any one local policy-maker or which one is dominant depends in part on the particular municipality's or community's resources and socio-economic and natural environment.

Communities and municipalities frequently own and manage forest land themselves, which offers additional opportunities related to innovative governance for FES provision and financing (for more details see also recommendations to forest owners and managers).

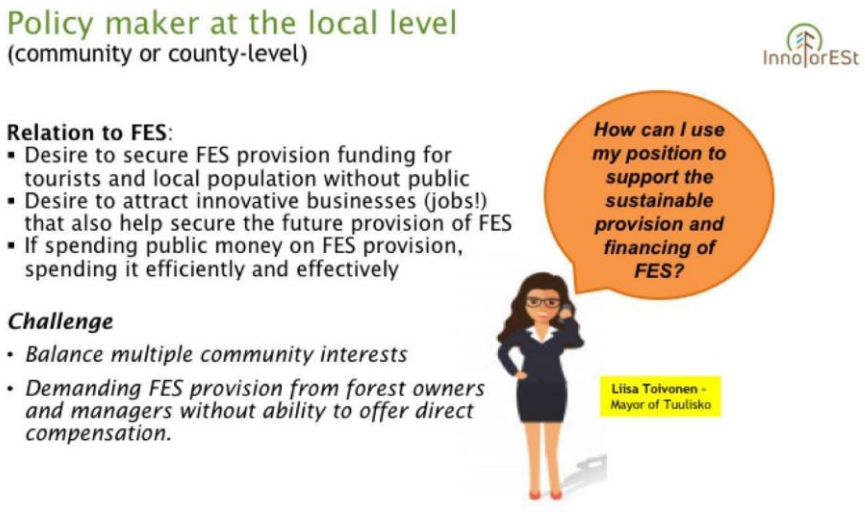


Figure 11 Local policy-maker - Persona

The principal recommendation is to develop a clear vision of what you would like to achieve in terms of innovative approaches to FES provision and financing. Based on this vision the following five overarching themes should be addressed.

Maintaining direct link to FES provision and financing

Maintaining a clear connection between the innovative governance mechanism being developed and FES provision and financing is crucial. Doing so requires a continuous and conscientious consideration of the governance mechanisms (potential) impact on forest management and FES provision. Local policy-makers can contribute to this reflection by:

- encouraging forest sector stakeholders to participate, as they are well equipped to reflect the forest management and FES provision implications of the scenarios discussed.
- involving municipal forest experts in the innovation development process, if the community owns forest itself and has forest management staff.

Bringing diverse stakeholders together

Based on InnoForES't experiences, local policy-makers are in a position to support stakeholder network building and innovation development processes by engaging in ongoing local level initiatives in a supportive role. Doing so may well benefit policy-makers in advancing their own (green) agenda, may offer new sources of funding and eventually contribute to the maintenance of FES in the area. Local policy-makers interested in using their position to support stakeholder network and innovation development processes in their communities are recommended to:

- facilitate stakeholder network building processes by offering meeting space or hiring financing a professional moderation service (see Aukes et al. 2020/D5.5 for information on methods for workshop design) to support local level initiatives in their innovation development process.
- support local initiatives in bringing diverse FES-related stakeholders together, for example, by approaching them directly and encouraging them to participate.
- attend meetings in person to show support and interest.

Structured, facilitated stakeholder network building

The experiences in the InnoForESt IRs has shown that local policy-makers can take an important supportive role in the network building processes. The recommendation is to

- take advantage and participate in ongoing stakeholder development processes and attend meetings and events in person to show support and interest; engaging that way may also result in a better understanding by local policy-makers of how to provide even more systematic support.
- encouraging the use of a systematic stakeholder analysis to inform local stakeholder network building (see Sattler 2019/D4.1 for details on methods, Aukes et al. 2020/D.5.5)
- take advantage of existing networks to other policy-makers and communities/regions to invite external speakers on FES-related issues, best practice examples, or facilitate excursions to similar/relevant initiatives.
- support or initiate applications for funding, for example, in the context of research projects, rural development funds related to FES-oriented projects or else, which may offer access to a broader network and additional opportunities for network building.
- local policy makes can - through their local administration - also become an active, driving force in network building processes by taking the leading role in identifying and contacting relevant stakeholders, and organising and moderating stakeholder meetings (see Sattler 2019/D4.1).

Facilitated innovation development

One major element of the CINA workshop concept is the development of scenarios with stakeholders. Both the process of working to develop them as well as the actual output - the scenarios themselves - were identified as a key element by practitioners in the overall innovation development process. The recommendations to local policy-makers to support ongoing innovation development processes for FES provision and financing are:

- encourage the use of a systematic innovation development concept, such as CINA applied in InnoForESt (see Aukes et al. 2020/D5.5 for more details).
- take advantage and participate in ongoing innovation development processes and attend meetings and events in person to show support and interest and to learn more about the role of forests and FES in your realm.
- encourage active participation by a diversity of stakeholders in the scenario development process, including in particular forest owners and managers as this process is an important opportunity to ensure a clear connection between the scenarios developed and FES provision and financing (see also next section).
- support local initiatives in efforts to apply for funding through academia or rural development programs at national and EU levels that can support the innovation development process financially.
- if in a leading role, local policy-makers can - through their administration - take an active role in facilitating the innovation development process.

Communities and municipalities frequently own and manage forest land themselves, which offers additional opportunities the innovation development process, including offering public land for implementing innovative measures for FES provision, e.g. in the context of a test pilot or actual implementation of an innovative governance mechanism.

Payment mechanisms for FES provision

Local policy-makers can engage in different ways in each of the three business models, largely as 'customers' but sometimes also as providers.

<u>Direct compensation schemes</u>

Local policy-makers can support local (voluntary) compensations schemes for FES provision, for example, by:

- purchasing certificates, for example, (voluntarily) offsetting biodiversity or carbon footprints associated with municipal activities.
- supporting marketing strategies for local and touristic buyers of the certificates

<u>Indirect finances from timber-based value chain</u>

Local wood value chains can be one way to support FES provision and financing, if certain conditions are met (see IR Austria, next chapter 3). If such value chains exist locally, local policy-makers are recommended

- to support local forest-wood value chains that can be expected to have a positive impact on FES provision in the region through public procurement policies, i.e. purchasing wood products from businesses whose production also contributes to securing the provision of FES.
- Influencing local timber based business development in a way that part of the revenues refinance multi-functional forest management for other FES as well.

Income from non-sectoral economic activities based on FES

FES-based economic activities include activities such as recreational offers taking place in the forest (i.e. forest bathing) or educational programmes in and about the forest. While their direct and financial contribution to maintaining the future provision of FES is limited, societal demand for these types of offers is increasing. Thus, there are opportunities for local policy-makers to engage, for example, by:

- hiring staff or outsourcing offers for FES-based products and services in municipal forests such as recreational offers targeting tourists visiting the region or compensation certificates for biodiversity loss or carbon emission (see also IR experiences in Aukes et al. 2020/D4.2); some of the methods used in InnoForESt may aid the development of such ideas (see Sattler 2019/D4.1)

Lastly, policy-makers at all levels are able to use their position and associated networks to lobby for greater recognition of FES's ecological and socio-economic benefits and for appropriate funding to secure their future provision.

2.5 National and EU-level policy-makers

InnoForESt findings indicate a key role for policy-makers at national and EU levels in securing the future provision and financing of FES.

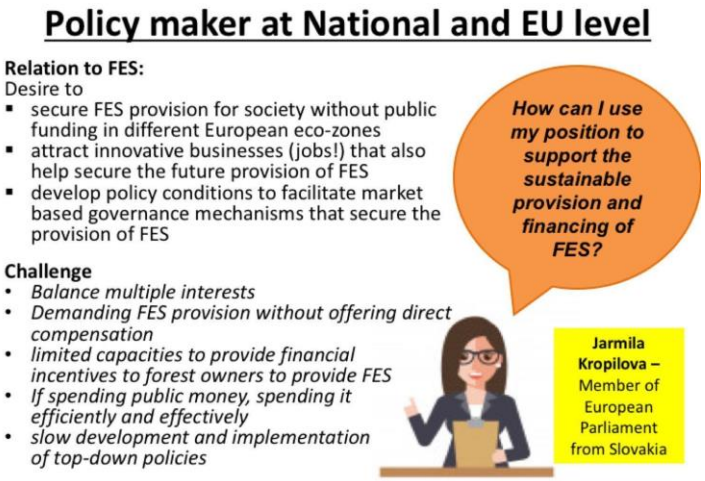


Figure 12 National and EU policy-maker - Persona

Following LULUCF, the new EU-Bioeconomy strategy, and the EU Biodiversity Strategy for 2030 the biggest political potential for integrating means for the sustainable provision of FES lies in the further development and implementation of the Green Deal and the associated policy processes including the EU Biodiversity Strategy for 2030, EU Farm to Fork Strategy, the EU Climate Action and the EU Forest Strategy. As of now the roles of forests ascribed in these policy initiatives are limited as carbon sink and for conservation of biodiversity. The multiple other provisioning, regulating and cultural ecosystem services forests provide to society are acknowledged only in very few statements. EU forestry and the forest-based sector can contribute much more for reaching the climate, biodiversity, economic and social objectives than the proposal now indicates Hetemäki (2020). InnoForESt findings suggest that the potential of these policy strategies to foster FES provision can only be realized if the goal of securing FES provision is integrated into existing and emerging governance and funding schemes. It should be addressed as an explicit objective that is pursued through targeted political steering and public support for private *profit and non-profit* business innovations. The focus should rest on securing the full range of regulating FES, such as air and water quality, soil protection, flood and erosion control, as well as carbon sequestration. In addition to compensation mechanisms, InnoforESt findings suggest there is also value in targeted support for local level initiatives that aim to secure FES provision through network based approaches.

In addition, the lately proposed '*Green Recovery*' measures and investments to support the economy during and after the economic crisis 2020 induced by the covid-19 pandemic offer links to fostering the provision of FES, provided they seriously shape the structural change towards a sustainable (bio-)economy that acknowledges the important role of multifunctional sustainable forest management. The current proposals (as of July 2020) have been criticised for falling short of being sufficient.

Climate Smart Forestry could mitigate up to 20% of the (current) EU emissions depending on various assumptions concerning the LULUCF regulation (Nabuurs 2018). One key challenge is to understand the potential trade-offs and synergies between climate mitigation and adaptation, biodiversity and economics. With the intended reduced use of fossil fuels, investments in renewable resources are indispensable. Without active forest management carbon sinks will saturate. Maximising carbon uptake and storage in forestry and the wood-based sector again may lead to higher economic and ecological risks and potentially lower biodiversity levels.

The complex issue of forest biodiversity and the bioeconomy (Bauhus et al. (2017) has been summarised and placed into the context of the Green Deal by Bauhus in May 2020. Increasing the coverage of strictly protected areas is considered unlikely to be the most effective and efficient approach, especially in the context of climate change. New models of forest management are needed to overcome the conflict between biodiversity and economy. The bioeconomy could be a framework for this, as it could provide income to forest owners to also fund forest management measures which help to secure the multi-functionality of forests, provided the income streams are steered accordingly. Last not least, this leads to the human dimension of forest owners. It is considered essential to engage the EU 16 million private forest owners, in addition to public forest managers, as well as the forest-based industry to reach the goals of the Green Deal (EFI ThinkForest 20 May 2020).

The Green Deal and the sustainable financing and EU Taxonomy strategy connected with it could provide additional economic incentives. Sustainable finance is a work stream expected to channel private investment to the transition to a climate-neutral economy, while the EU taxonomy for sustainable activities works in view of the establishment of an EU classification system for sustainable activities.

Consequently, the Green Deal has to express and enable all these forest related aspects strongly in follow up Regulations and Strategies on EU and national levels to contribute to the sustainable provision and financing of forest ecosystem services.

Results of InnoForESt suggest that a combination of legislation and targeted public funding can lead to those kinds of public private partnerships and private investments needed to sustainably supply FES in the long term. Given the heterogeneity of FES, forest management practices, and institutional settings surrounding FES governance, securing FES provision demands a variety of solutions tailored to different situations. Hence, an EU-wide emphasis on the importance of FES provision and financing (see also Wolfslehner et al. 2020) and top-down support for bottom-up efforts through EU and national level action is needed. Policy-makers also have the option of steering public forest management towards FES sensitive best practices through the participation in respective certification schemes, e.g. FSC and PEFC. Thereby they influence the supply as much as the demand side of markets for products and ecosystem services from sustainable forest management and may serve as models or even advisors for private forest owners. Finally, innovation processes are long-term endeavors. Their development takes time - and thus requires continuous rather than one-time short term political and financial support.

Maintaining direct link to FES provision and financing

Whether through various, more or less congruent policy strategies, legislation, or targeted funding, the objective of securing FES provision and financing requires a conscientious reflection on the eventual impact a piece of legislation or funding programme actually has on FES provision and financing. As InnoForESt results show, the (potential) impact of the various governance mechanisms analyzed on FES varies considerably (see also Maier and Grossmann 2019/D6.2). Hence, funding and legislation aimed at securing FES provision are recommended to be based on:

- a systematic assessment of the current supply and demand of FES (see also Primmer et al. 2018/D2.1, Geneletti et al. 2019/D.2.2) (see also Figure 3).
- a systematic analysis of the impact pathways of funding or legislation on FES provision. The heterogeneity of ecological and socio-economic systems likely requires a certain level of flexibility regarding how the particular FES-related objective(s) and means to achieve them are implemented in a particular region.
- Increase the support for adaptive capacity and restoration of biodiversity and ecosystem functioning of all forests.

Bringing diverse stakeholders together

Building diverse stakeholder networks is an important first step towards developing locally adapted innovative governance mechanisms for FES provision and financing. InnoForESt results point to the need for targeted public financial support of key local level actors who can facilitate the development of such networks. Hence, policy-makers are recommended to:

- provide targeted funding for organisations that are able to facilitate stakeholder network building processes, such as non-governmental, non-profit organisations in the fields of rural development, nature conservation, sustainable forest management, climate resilience, and others.
- tie funding to the following criteria:
    - a clear FES-related objective and demonstrated consideration of forest management implications and (potential) FES impact as a result of the innovation development process, for example, through the involvement of forest owners and managers or their representatives.
    - use of proven methods that promise comprehensive stakeholder networks, such as the ones used in InnoForESt (see Sattler 2019/D4.1 for details).

Structured, facilitated stakeholder network building

The InnoForESt IRs went through a structured stakeholder network building process aimed at collaboratively developing a governance mechanism (further) suitable to spark innovations. The respective regional processes were initiated and accompanied by a team of scientists. They followed a particular concept called 'Constructive Innovation Assessment' (CINA) (see Chapter 1, Aukes et al 2019/D5.1). Certain key elements of this process were deemed particularly important by practitioners and were recommended if pursuing a similar endeavor. These lessons learned allow for the recommendations to national and EU policy-makers to:

- encourage the development and strengthening of diverse local and innovative networks concerned about FES provision and financing through targeted funding of local level initiatives and network building activities like trans-sectoral and transboundary moderated workshops, excursions, and exchanges.
- tie funding to:
    - a clear FES related objective and demonstrated consideration of forest management implications and (potential) FES impact as a result of the innovation development process, e.g. through the involvement of forest owners or their representatives.
    - use of proven methods for innovation development processes, such as the ones used in InnoForESt (see Aukes et al. 2020/D5.5 for details).

Facilitated innovation development

The InnoForESt project established physical and digital platforms to provide the work floor for innovation development. These platforms offer spaces to meet, exchange, and work together in meetings, seminars, and workshops. As we have shown above none of these necessary early and indirect investments into innovation processes aiming at the sustainable provision of several FES are yet able to fully function as private businesses.

National and EU-Level policy makers can support these necessary platforms by longer term co-financing of:

- physical centers like office space to work and interaction.
- coordination support like network management and conduction of innovation workshop activities.
- digital means of communication such as specific websites and data safe conferencing tools with open and protected spaces for different types of knowledge exchange.
- Professional support to design and update information material, contact information, event calendars and blogs as well as latest news in the local languages.
- Offers of external training e.g. in business administration, marketing and moderation.
- incentives for external participants such as compensation for the loss of work time, and travel costs to workshops.

InnoForESt's results proved the necessity to engage a broad range of stakeholder with different backgrounds and qualifications esp. decision makers from forest practice and local administration as well as otherwise interested actors from other business sectors, civil society, nature conservation, agriculture, and tourism. With these platforms and innovation networks in place, the foundation was laid for (1) a connection of different networks, i.e. the establishment of stakeholder networks across the Innovation Regions; and (2) the inclusion of additional national or even European stakeholders. These extended networks could include actors from other regions, the national level, and representatives of different sectors that may become involved in networking activities over time. Unfortunately, this upscaling network was hampered by the Covid-19 outbreak.

- National and EU policy-makers should therefore not lose sight of these intermediate successes achieved but thwarted approaches and pick up or continue their support not only through offers of "budget neutral timeline extensions".

Payment mechanisms for FES provision

The IRs involved in InnoForESt have implemented different approaches to finance the provision of FES, ranging from voluntary compensation payments for biodiversity conservation, and carbon sequestration, to partnering with regional wood processing businesses for advancing markets for provisioning FES from mixed resilient forests and FES-based recreational and educational offers. So far, none of the IRs has been able to establish a self-sufficient sustainable private market financing mechanism or business model for the provision of regulating and cultural FES. The (potential) impact on securing FES provision in the future varied strongly. Most of the payment mechanisms and innovative business models analysed depended on some form of public involvement, and are expected to continue to do so in the future.

InnoForESt findings indicate that a purely private market-based mechanism to secure FES provision in the long term seems not feasible. Instead, initiating mechanisms for at least partial private financial contribution to economically managing forests for FES provision - particularly regulating and cultural FES - requires systematic, targeted financial and legislative support by national and EU policy-makers with outcome oriented, flexible instruments.

Direct compensation schemes

One promising option to secure the future provision of FES is to pass legislation requiring compensation payments for offsetting biodiversity loss or carbon footprints. InnoForESt findings indicate such legislation is needed, as the voluntary compensation schemes analyzed in InnoForESt do not sufficiently incentivise potential clients to offset their footprints, especially not in the long term or on a large geographic scale. Experience with the implementation of such legislation already exists within the EU, for example in Germany, where certain actions that result in a loss of biodiversity, such as infrastructure development, have to be compensated by protecting or restoring another area, often by paying external providers such as private forest owners for this service. The recommendation to policy-makers is to:

- identify and learn from well-functioning compensation mechanisms based on national or federal state legal requirements that could be implemented nation-wide or EU-wide (see also Primmer et al. 2018/D2.1, Geneletti et al. 2019/D2.2 for an overview of current institutional context surrounding FES provision across Europe; Sorge and Mann, 2018; Aukes et al. 2019/D5.1).
- pass legislation that requires compensation payments for offsetting biodiversity and/or carbon footprints including associated standards for associated forest management practices where this is not yet the case.

Indirect from timber-based value chains

Forests and their management for provisioning, regulating, and cultural FES are closely related to a number of different policy fields, in particular rural economic development, but also biodiversity protection or climate change mitigation. Each of these connections offers potential avenues for greater consideration of FES and their provision (Wolfslehner et al. 2020). Public funding programmes exist intending to steer economic forest management more towards biodiversity conservation (e.g., Natura 2000), limited success with private forest owners suggests adaptations would be advisable for this and other funding programmes in other sectors to integrate more emphasis on their impacts on FES provision.

InnoForESt findings suggest that under certain conditions, timber-based value chains do provide potential opportunities to secure also the provision of regulating and cultural FES. They also point to synergies with rural development programmes and goals. Thus, policy-makers are recommended to:

- continue the rural development programmes.
- identify potentials for better including FES provision into existing rural economic development programmes. More explicit inclusion of the ecosystem service approach may contribute to reach a double dividend out of these policy instruments. When doing so, it is important to recognise that specific criteria are needed to ensure an actual positive impact on FES provision, as not all forest-based (economic) activities imply a beneficial effect on FES provision (see also section on 'maintaining a direct link to FES provision and financing' above (see also Maier and Grossmann 2019/D6.2).

Income from non-sectoral economic activities based on FES

FES based non-sectoral economic activities found and analysed in InnoForESt include recreational offers taking place in the forest (i.e. forest bathing) or educational programmes in and about the forest. Their contribution to maintaining the future provision of FES is limited, not the least because the revenue generated is insufficient to trigger forest owners to manage their forest for FES provision. At the same time, societal demand for these types of offers is increasing and economic spin offs of ecologically responsible tourism related to forests is an important contribution to rural development. To secure the provision of these services and associated FES, national and EU policy-makers are recommended to

- consider better public financial compensation to forest owners for the (regulating and cultural) FES their forests provide.
- consciously and consequently consider the provision of multiple FES when developing and implementing the.
    - the European Green Deal and the individual policy strategy it entails, in particular the 'Farm to Fork' Strategy, the EU Biodiversity Strategy, and the EU Climate Action
    - sustainable financing and EU Taxonomy strategy within the EU Green Deal to make FES oriented forest management attractive to new private investments.
    - new Bioeconomy strategy for 2030, to acknowledge and address esp. provisioning and regulating FES
    - the EU emissions trading system, to better include established forests and their regulating FES in the carbon market
    - LULUCF
    - Developing the EU Forestry Strategy

Innovation processes needs time

Working in a publicly funded Innovation Action that builds on the idea of a multi-actor approach taught us that three years are too short to already achieve measurable impact. Inter- and transdisciplinary projects are demanding as a lot of efforts, needed not only to understand each other but also to trust each other and find ways how to make best use of each other's knowledge and experiences. As such, we recommend establishing funding formats for longer periods of time for a better valorisation of knowledge and trust built and foundations laid for future innovation assessment.

2.6 Scientists and future research funding

In addition to the actor-specific recommendations summarised above, InnoForESt has identified future research needs related to FES governance, as well as generated insights regarding transdisciplinary research. The recommendations presented here are thus of relevance to scientists working on FES governance, scientists working inter- and trans-disciplinary, as well as funders of respective research endeavors.

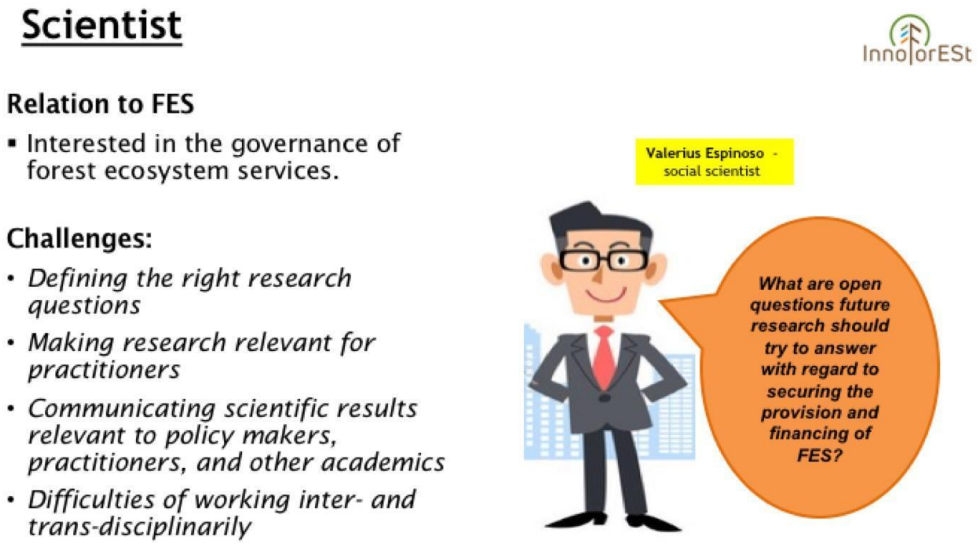


Figure 13 Scientist - Persona

The InnoForESt project approach is an international inter- and transdisciplinary applied research approach (Innovation Action). It has focused on innovative governance mechanisms mainly relying on the private market to secure the future sustainable provision and financing of FES.

Two key findings should be considered in future research endeavors:

First, there is a need to differentiate between FES-based activities and activities aimed at securing FES. FES are closely related to a number of economic sectors, societal interests, and policy fields. These links to multiple disciplines and sectors offer opportunities as well as challenges. Most importantly, it demands continuous reflection on a governance innovation's (potential) impact on forest management, on FES provision, and on forest-based income, which are distinct and not necessarily mutually reinforcing aspects. These reflections should guide every research step, in particular the selection of case studies and methods.

Second, the project's findings indicate that, while there is potential for private sector involvement, securing the provision of FES requires a certain level of public involvement. This is particularly true for regulating and cultural FES, many of which are common pool resources or have a public goods character. This public involvement can take the form of legislation, such as obligatory compensation payments for FES lost, for example, due to infrastructure development, as well as targeted support for bottom-up initiatives that develop locally adapted, public-private solutions (see also recommendations to national and EU policy-makers).

Future research to this aim is therefore recommended to:

- clearly identify and maintain its FES-related objective, and continuously consider the research's (potential) effects on forest management, FES provision, and forest-based income.
- focus on identifying the most effective and efficient types of governance, in particular public-private partnerships for securing FES provision. Individual European countries may already have well-functioning systems in place that could be transferred to other EU Member States. More (comparative) research on existing national and regional legislation, its effectiveness in securing FES provision, and its transferability to other countries is needed.
- focus on effective methods to adequately evaluate and compare ecosystem benefits to facilitate the exchange of FES lost with restoration of FES elsewhere.
- focus on societal perception of different FES, including which FES are recognised as important, which are not. In this context, the influence of cultural values and backgrounds, regional identity, and traditional knowledge on FES perception should be explored.
- develop user-friendly tools for practitioners to assess and monitor FES quality and quantity.
- invest in understanding the motivations that drive voluntary compensation payments.
- involve both social and natural scientists; complex challenges like securing FES provision requires collaborative processes and communication among diverse actors, hence, social science perspectives such as psychology, sociology, or communication sciences are crucial.

Research is most often funded by public and political bodies interested to see the research results to feed into different information and development channels. Scientists should therefore more explicitly plan capacities not only for reporting and scientific publishing but also for necessary translation of research results into suitable formats, style and languages for different actor groups within the project lifetime or even after, esp.

- Plan and apply for the need for professional external support a.o. for design, IT support, host platforms, translation, print of dissemination material.
- Participate in political participatory or expert consultation processes by answering respective surveys and submitting research based strategically prepared position papers (see Morand et al.2020/D6.4).

Research projects involving multiple disciplines, scientists as well as practitioners, come with their own set of intercultural challenges. Addressing these proactively and with foresight is a key to making the most of transdisciplinary opportunities. Funding requirements can maximise future research's impact by reflecting these considerations and demand convincing proposals for how these recommendations can be brought to life. Based on InnoForESt experience, recommendations include:

- placing an emphasis on regular, frequent, and eye-level communication between scientists and practitioners from the very beginning.
- consider potential intercultural discrepancies in the perception of hierarchies within the consortium.

- consider the potentially unequal distribution of budget available for project activities between science and (individual) practitioners.
- being efficient and respectful of practitioners' time:
- design: incorporate the needs and interests of practitioners into the research design from the very start, to ensure the research project can address local needs, in addition to scientific interests.
- coordination: coordinate well among the research team to ensure practical suggestions, methodological and conceptual guidance, and requests towards practitioners are well aligned to avoid practitioners feeling pulled into different directions, be asked to complete similar tasks multiple times, or even receiving contradicting advice or instructions.
- implementation: eyelevel collaboration between scientists and practitioners to find a balance between scientific interests and associated choice of methods, and practitioner's needs and concerns. Matching practitioners needs with academic interests.
    - is a matter of well-founded case study selection.
    - is a matter of identifying and communicating clearly the added value and purpose of certain tasks. It requires early and in-depth communication about the envisioned scientific methods and the intended objective. It is crucial to generate a common understanding of the scientific process' purpose and potentially requires adjusting the research process to accommodate practitioners' needs and concerns not only for the ongoing research but also for the future uptake and replicability of successful analysis and development approaches.
- using everyday language when communicating within the project team, as well as in disseminating activities and products targeting the general public;
- establishing and using a glossary to clarify terms can aid communications among the science partners and between science and practitioners; needs to be established from the very beginning and updated regularly.
- expecting the unexpected - unexpected events require scientists and practitioners to rethink and re-establishing strategies and proceedings together. Having built a good relationship through prior regular exchange aids in this process.

Following these recommendations in practice takes time. Entities funding research are recommended to reflect the need for early, and continuous, in-depth communication within international, intercultural, multilingual, transdisciplinary teams through their funding requirements, but also accommodate by providing sufficient amounts of funding to both scientists and practitioners also for external support services.

In InnoForESt, IR practitioners played a leading role in implementing a series of workshops and other meetings with stakeholders in their respective regions as part of an innovation development process. Workshops were guided by the CINA workshop concept and accompanied by a team of scientists (see also Aukes et al. 2020/D4.2). The following recommendations based on InnoForESt's experience are relevant to research endeavors working with practitioners, particularly when asking them to implement some (form of stakeholder networking) activity in their region. To make the most of such activities, science teams can offer different types of support to the practitioners:

- invest sufficient time into a preparatory phase that includes a systematic and detailed analysis of the status quo - in the case of InnoForESt, that included a stakeholder analysis, an assessment of existing networks and collaboration among stakeholders, and a governance situation assessment. These activities were conducted in close collaboration between science and practitioners (for more on the methods applied see Sattler 2019/D4.1).
- consider the application for an provision of financial incentives for external participants such as compensation for the loss of work time, and travel costs to workshops in order to be better create and maintain a sustainable network cooperation.
- provide hands-on guidance for workshop implementation - relating to practicalities such as timing, but also moderation tools, such as poster templates, interactive methods, documentation and reflection of workshop outcomes, etc.
- provide practical guidance on tools, methods, and moderation techniques available to use in the workshop, for example, for documenting discussions and workshop outcomes in non-academic, everyday language. These materials should be tailored to the specific target stakeholder group you are trying to reach, for example, adapted to the stakeholders' level of education or profession.

3 Concluding remarks

Over the past three years, InnoForESt has worked with and in six IRs across Europe to (further) develop and analyze innovative private market-oriented governance mechanisms that show potential to become alternative or complementary means of securing FES provision and financing (for further details on the specific IR see Maier and Grossmann 2018/D6.2 and the ANNEX to this report). The objective of this report is to summarize the overarching findings and formulate recommendations to specific target groups interested in the project's lessons learned for stakeholder and innovation development for FES provision, as well as payment mechanisms for FES provision.

This chapter summarises key conclusions that have emerged from InnoForESt's work. These conclusions complement – and are reflected in – the targeted actor recommendations outlined in Chapter 2. An analysis of the acceptance, implementation, or influence of public or public-private funding programmes was not within the objectives of the project.

Governance mechanisms (potential) impacts on forest management, FES provision, and forest-based income can vary considerably. These are three distinct elements and not necessarily mutually reinforcing.

FES are closely related to a number of economic sectors, societal interests, and policy fields. This interdisciplinary, cross-sectoral nature of FES provision offers opportunities as well as challenges. Most importantly, it demands continuous reflection on a governance innovation's (potential) effect on forest management, FES provision, and forest-based income, which are distinct and not necessarily mutually reinforcing elements. In this context, it is important to acknowledge that different governance mechanisms have different implications for these three elements. The impact is furthermore strongly dependent on the local context. As illustrated by the InnoForESt Innovation Regions, a governance mechanism's implications for forest management and FES provision ranges from very indirect (e.g., IRs Sweden, Austria) to very direct (e.g., IRs CZ, DE, FI); as a result, a successful innovation process does not automatically imply successful securing of FES provision, particularly in the long term. Likewise, an innovations' expected impact on forest management practices and its contribution to sustaining future FES provision can vary considerably and are not necessarily mutually reinforcing – i.e. strong impact on forest management does not automatically imply strong increase in FES provision or vice versa. Not the least because the innovation's impact on FES provision has to be put into context to the initial level of FES provided in a particular place. For example, the governance innovations in the IRs in Finland and the Czech Republic are expected to have a strong impact on forest management, as biodiversity conservation did not play a dominant role in past forest management practices. Here, the level of FES provision is expected to increase. In the Italian IR, the governance innovation is expected to maintain a well-established type of forest management to halt the further loss of FES provision; the governance innovation is expected to maintain the high level of FES already provided. These insights about the variable relationship of governance mechanism, forest management implications, and impact on FES should be applied both with regard to stakeholder network building processes, the development of innovative income opportunities, as well as the development of payment mechanisms for FES provision.

Payment mechanisms financing the provision of FES require a clear denomination of the (different) FES addressed, clearly defined FES related objectives and context specific solutions

The development of payment mechanisms for FES provision has proven more challenging and hardly feasible within three years' time. Thus far, none of the Innovation Regions has developed a self-sustaining business model that secures FES provision and financing. Nevertheless, important insights have emerged: As a payment mechanism's impact on FES provision can vary considerably its development has to be tied to an explicit FES objective in a particular area. Ecologic conditions, societal demand for particular FES, economic challenges facing forest owners, as well as the institutional setting governing forest management and its use vary across Europe. Hence, context specific analyses and solutions are required. Due to this context specificity of FES provision, the same payment mechanism may not be suitable for the same FES (provision objective) in different countries or regions. Furthermore, a number of business models rely on the provision of FES but do not necessarily contribute to securing their future provision. Examples include forest-related education, forest-based health, and wellness or recreational offers in forests, which are frequently offered by individuals other than the forest owners or managers. In these cases, forests and their FES serve as the backdrop for entrepreneurial activities that often do not provide revenue to forest owners or actively pursue the maintenance of FES provision, at least not in the short and medium term.

Securing FES provision and financing hinges on public policy and support, which can be integrated into public policies and initiatives that already exist in the fields of rural economic development, climate change resilience, and biodiversity protection.

Our InnoForESt findings also point to a key role for public entities in FES provision and financing. Several IRs have benefited from stakeholder network building support in the context of prior publicly funded projects, mostly through European and national rural economic development funding, as well as public research funding, including the support received through InnoForESt. More importantly, in several IRs, public entities are central figures with crucial roles in the emerging governance mechanism and innovation process. This ranges from public administrations taking the lead in building stakeholder networks in Italy, providing public forest land for afforestation in Germany, to municipalities acting as (primary) purchasers of compensation certificates in Finland. Another form of public involvement and support is evident across most IRs: particularly those IRs working on compensation schemes see a need for public involvement in the form of legislation. Purely voluntary compensation schemes appear to provide insufficient incentives for commitment substantial enough to positively impact FES provision in the long term. InnoForESt findings suggest that public support for FES provision can well be integrated into already existing public programmes and initiatives. Working in and with the IRs, the close interconnection between FES and an array of economic sectors and policy fields became evident. Close connections to rural economic development, in particular related to tourism and regional forest-wood value chains, but also climate change resilience, and biodiversity protection indicate great need to sustain FES, as well as potential to advance FES provision and financing in the future. We conclude that this potential can only be realised if FES provision is integrated into existing and emerging governance and funding mechanisms as an explicit objective that is pursued through targeted political steering and public support for private business innovations.

FES assessment and monitoring systems should be prerequisites for public support and should include data on forest ecosystem conditions, abundance and changes of different the availability FES, societal demand for FES, as well as information on the institutional setting and economic revenue streams.

The need for an explicit, context specific FES objective in governance innovation processes in combination with some form of public involvement results in the recommendation to take up or establish a FES monitoring system. InnoForESt has taken a first step by analysing existing assessment data and mapping the currents state of the provision and political demand of various provisioning, regulating and cultural FES (Primmer et al. 209/D2.1, Geneletti et al. 2019/D2.2. , Varumo et al. 2020/D2.3). To actually evolve into a monitoring system changes will need to be assessed and documented in regular frequencies. This would serve to inform and guide policy and forest management decisions based on context specific information regarding the current supply and demand of FES in a particular region, as well as track the impact on FES provision over time. To do so, a monitoring system ideally continue to include data on forest ecosystem conditions, societal demand for FES, but also information on regional institutional setting, economic revenue streams and their developments.

The biggest political potential for integrating means for the sustainable provision of FES lies in the further development and implementation of the Green Deal, provided the structural change actively integrates the important role of multifunctional sustainable forest management.

The biggest political potential for integrating means for the sustainable provision of FES lies in the further development and implementation of the Green Deal and the associated policy processes including the EU Biodiversity Strategy for 2030, EU Farm to Fork Strategy, the EU Climate Action and the EU Forest Strategy. Currently ongoing, these policy processes offer windows of opportunities to pro-actively foster the provision of FES, in particular the full range of regulating and cultural FES, through network-based approaches as well as payment mechanisms. Most of these initiatives emphasize forests' role in sequestering carbon and biodiversity protection. Several mention the need for creating incentives for more sustainable and multi-functional forest management to achieve these objectives – e.g. the EU Farm to Fork strategy explicitly states the need for compensation payments and an associated system of robust certification rules for carbon sequestration. Likewise, LULUCF, the new EU-Bioeconomy strategy, as well as the EU taxonomy strategy all offer links but also risks to increase the political and practical support for enhancing the provision of FES. InnoForESt findings suggest that the potential of these policy strategies to foster FES provision can only be realized if the goal of securing FES provision is integrated into existing and emerging governance and funding schemes. It should be addressed as an explicit objective that is pursued through targeted political steering and public support for private *profit and non-profit* business innovations. The focus should rest on securing the full range of regulating FES, such as air and water quality, soil protection, flood and erosion control, as well as carbon sequestration. In addition to compensation mechanisms, InnoforESt findings suggest there is also value in targeted support for local level initiatives that aim to secure FES provision through network based approaches. In addition, the recently proposed '*Green Recovery*' measures and investments to support the economy during and after the economic crisis 2020 induced by the covid-19 pandemic offers links to fostering the provision of FES, provided they seriously shape the structural change towards a sustainable (bio-)economy that acknowledges and actively integrates the important role of multifunctional sustainable forest management. The current proposals (as of July 2020) have been criticised for falling short of being sufficient.

While forestry innovation systems are inherently a context-bound social-ecological-technical issue, a certain level of homogenisation of national FES-supportive regulation and legislation within the European Union is expected to benefit FES provision and financing.
While securing FES provision is an inherently context-bound social-ecological-technical issue (Sorge and Mann 2019/D 3.1), InnoForESt's findings indicate that it would benefit from a certain level of homogenisation of national FES-related regulation/legislation within the European Union. We recommend to increase policy-level coordination to emphasise FES provision and financing in EU directives (see also Wolfslehner et al. 2020) and national level legislation that advance FES provision through targeted public support for private market mechanisms. In a less heterogeneous institutional setting, investments in support for FES provision can be expected to have greater impact, and best-practice examples are more easily implemented elsewhere. In addition constant (intended and unintended) impacts of changing reguioation on FES provision and financing should be reflected based FES supply and demand monitoring data and fed into a continuous learning process.

Building diverse stakeholder networks is important for local level governance innovation development. Forest owners and managers play a key role in these networks.
Advancing diverse local stakeholder networks is a fundamental step of developing innovative governance mechanisms for the purpose of securing FES provision and financing. We found that the 'InnoForESt approach', which includes a number of activities that took place in the Innovation Regions (see Aukes et al. 2020/D5.3), was successful at bringing diverse stakeholders together to (further) develop innovative governance approaches related to the provision of FES. Having proven successful, Sattler 2019/D4.1, Aukes et al. 2020/D4.2, Schleyer et al 2020/D5.4 detail the tools and methods used for stakeholder network development for practitioners to use. At the same time, forest sector actors, particularly forest owners and managers play a key role and have to be included in any effort to secure FES through (semi-) private market mechanisms. Not only does their land and/or work provide the FES intended to be secured, but they are also able to communicate forest management and FES implications of potential governance solutions discussed.

The potential of private market based innovative governance mechanisms is limited to complementing policy led and public efforts to secure FES provision and financing.
Based on the insights gained through InnoForESt, we recommend future research on the issue of securing FES provision and financing to focus on the effective design of innovative public-private partnerships and effective instrument for financial support.

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Annex

A Innovation Regions – Stakeholder Networks, Payment Mechanisms, and FES provision

At the core of this project are six preselected so-called 'Innovation Regions' that pioneer novel governance mechanisms related to FES. As they develop their niche innovations, they have served as the basis for empirical research and analysis. Located in seven European countries, they vary with regards to the forest bio-geographical region, the particular (set of) FES in focus, and the innovative governance mechanism they pioneer to secure their future provision. Nevertheless, each IR can be subsumed either under a primarily stakeholder network based approach and/or as focusing on the development of a payment mechanism for FES provision – with two IRs combining both (see also Table 4).

Table 4 Overview Innovation Regions

Innovative governance mechanism	Innovation Region	Forest Ecosystem Service(s) targeted
Payment mechanism	Finland "Habitat Bank"	regulating FES: Biodiversity
Payment mechanism	Germany (Mecklenburg-Western Pomerania) "Forest Share/Waldaktie"	regulating FES: CO2 Sequestration
Payment mechanism & Network approach	Czech Republic and Slovakia (Cmelak resp. Hybe) "Collective Governance of Ecosystem Services"	regulating FES: CO2 sequestration, biodiversity
Payment mechanism & Network approach	Italy (Autonomous Province of Trento) "Forest pasture system management"	regulating FES: Water regulation, natural hazards protection, biodiversity cultural FES: tourism and recreation rural tradition
Network approach	Austria (Eisenwurzen) "Value chains for forest and wood"	Provisioning FES: timber (hard and softwood) cultural FES: Tourism, recreation, regulating FES: biodiversity
Network approach	Sweden (Helsinki) "Love the forest"	cultural FES: Tourism, recreation and cultural values

The following briefs outline each InnoForESt Innovation Region's objectives, its status before and after working with InnoForESt regarding their stakeholder network, payments for FES provision, as well as the (potential) implications for FES provision and financing (for more details on each IR and the specific activities that have taken place see Aukes et al. 2020/D4.2, 4.3, 5.3, Maier and Grossmann 2019/D6.2).

The IRs are different with regards to where they were at when InnoForESt began, the challenges they faced, and the solutions they have pursued. In the brevity of time - three years - much progress has been made with regards to the stakeholder networks in the regions. Many of the implications of these developments will only become visible in the long term. As of now, the IRs have not yet matured enough to deduct generalisable, replicable 'models' for securing FES provision and financing (see also Maier and Grossmann 2019/D6.2). However, they do point to important conclusions and lessons learned about securing FES provision and financing.

A.1 IR Finland – offsetting biodiversity loss through a Habitat Bank model

The Finnish IR is developing a compensation payment scheme connecting non-industrial private forest owners with private companies and municipalities to compensate the biodiversity loss that the latter two generate (e.g., through infrastructure development) through ecological restoration or protection of private land. Currently, biodiversity is conserved mainly through regulation and public funding. The innovation shifts the payment responsibility to the actors whose business activities result in biodiversity loss and creates new business opportunities for forest owners willing and able to restore and protect biodiversity. At the same time, it may provide an alternative forest-based source of income that is not reliant on timber production. Finally, it may create new types of jobs in the forest sector.

Some elements of the Habitat Bank are similar to other existing conservation programmes, such as the Forest Biodiversity Program for Southern Finland, the so-called METSO programme, which compensates forest owners for biodiversity protection measures in their forest. Thus the METSO programme has created models for the types of contracts needed by the Habitat Bank.

Stakeholder network

IR practitioners report that before InnoForESt, forestry and environmental stakeholders were working largely parallel to one another. Although the different administrative sectors collaborate, their approaches to biodiversity conservation differ. The workshops facilitated by InnoForESt offered an opportunity to discuss and develop ecological compensation innovation together. In the second workshop, when more specific discussions took place about contracting details and practical negotiations between companies and forest owners, participants confirmed the need for an intermediary to moderate and facilitate compensation contracting and negotiations. Businesses expressed a preference for being able to 'outsource' the management of ecological compensation, while private forest owners were looking for a trusted partner to represent their interests in compensation transactions. Thus, the Habitat Bank model was favored over other potential options (see Aukes et al. 2020/D4.2, D 6.2for more details on the scenarios). The InnoForESt project partners SYKE, the Finnish Environment Institute, and the Finnish Forest Center have offered to share the facilitator role; SYKE will offer a framework for measuring the biodiversity values while the Finnish Forest Center will hold the register of compensation sites.

Over time, the Finnish IR has experienced a change in potential clients interested in offsetting their biodiversity footprint. Originally, the Habitat Bank model targeted private companies. More and more, however, municipalities have become a primary stakeholder interested in 'habitat banking', for example, to offset new infrastructure developments.

Payment mechanism

During the first workshop, participants favored the voluntary contracting model that would have entailed a direct trading between forest owners and clients wanting to compensate. In the second workshop, when more specific discussions took place about contracting details and practical negotiations between companies and forest owners, participants favored the Habitat Bank model, and the associated mediators (see also above) who facilitate and manage the compensation payments.

The link between the funding generated and the forest management implications and FES provision is very direct as the funding generated is used directly to pay for restoration activities. The Habitat Bank pricing scheme is based in parts on the Forest Biodiversity Program for Southern Finland, the so-called METSO programme, which compensates forest owners for biodiversity protection measures in their forest. This programme also created models for the types of contracts needed by the Habitat Bank. The METSO programme also developed approaches to assess biodiversity values for sites in monetary terms, which is something the Habitat Bank partially built its own pricing scheme on. It is based on the costs of restoration activities and the land prices. This also means that in some cases, a high biodiversity value area that is cost-effective to restore can be more cost efficient than an area with low biodiversity values, but high restoration costs. The Habitat Bank aims to also include habitat characteristics and non-forest habitats, and thus amend the original assessment process.

The IR is still working towards implementing their first pilot transaction. Businesses that initially showed great interest have become less active. The Habitat Bank has developed during a time when compensation payments are advocated for in public and political discourse in Finland, where similar measures have become common in daily life (compensating emissions, consumers compensating the environmental footprint of food, etc.). The recent Finnish government programme for 2019-2023 explicitly addresses the need to experiment with compensation schemes in the context of biodiversity protection. However, so far businesses and municipalities have waited to act on habitat banking in order to see what government decisions will be made regarding obligatory compensation requirements. According to the IR team, government regulation demanding compensation would ease this situation. Currently, several unresolved technical questions hinder the implementation of offsetting contracts through the Habitat Bank model; including how to calculate ecological equivalence between degradation and offset sites, amount and type of flexibility allowed, what the duration of the contracts would be and who carries monitoring responsibilities etc. The Habitat Bank is working on these questions, but in the end guidelines will have to be set through legislation if compensations become mandatory in Finland.

Potential implications for forest management and FES provision

The network of stakeholders and the future implementation of the Habitat Bank model offers a new perspective for forest biodiversity conservation. In the context of InnoForESt, the focus has been on developing a process that can bring forest owners and potential buyers together and find a feasible way to facilitate transactions between them. If realised, the potential benefits to biodiversity conservation may be significant. The sites that offset biodiversity loss will be managed to increase biodiversity values. The sites typically offered are not suitable for timber production and are frequently in need of habitat restoration activities. While most of the sites are forested land, it can also include peatland areas in need of restoration. At the landscape level, the restoration of the parcels set aside are expected to have a positive impact on forest biodiversity. To gauge the Habitat Bank's impact on FES provision, a detailed monitoring and documentation by SYKE and Finnish Forest Centre (both leading the programme) of the amount of land actually subjected to restoration in a certain amount of time through the Habitat Bank (e.g., 1, 5, 10 years), and the type of restoration is envisioned. If possible, these achievements will then be assessed in light of existing restorability estimates.

Outlook

With the businesses generating biodiversity loss becoming more responsible, avoiding biodiversity loss will be more profitable. While the Habitat Bank may not cover a large proportion of land in the end, it will function as a tool to raise awareness about the need for forest biodiversity protection. Initially, the compensation scheme is not expected to have a significant effect on the management practices of forest owners in general but over time, forest owners might choose to specialise in producing biodiversity values while many will continue traditional forest management for timber production purposes, which will continue to be the focus on large parts of an individual owner's land.

Over time, the restoration activities may influence forest management practices on a larger scale. The intent is to have the restoration activities performed by traditional forestry actors, as they have access to necessary equipment. Yet, these actors will have to learn to use their equipment and forestry knowledge for the purpose of biodiversity restoration and protection. The Habitat Bank is also expected to result in job opportunities for individuals with a non-forestry background, particularly at the planning level. For traditional forest managers and these new actors in the forest sector to cooperate well, the IR team deems it crucial to achieve a change in attitude toward a broader view of forest management objectives to explicitly include various FES, particularly among the leadership of forest management organisations.

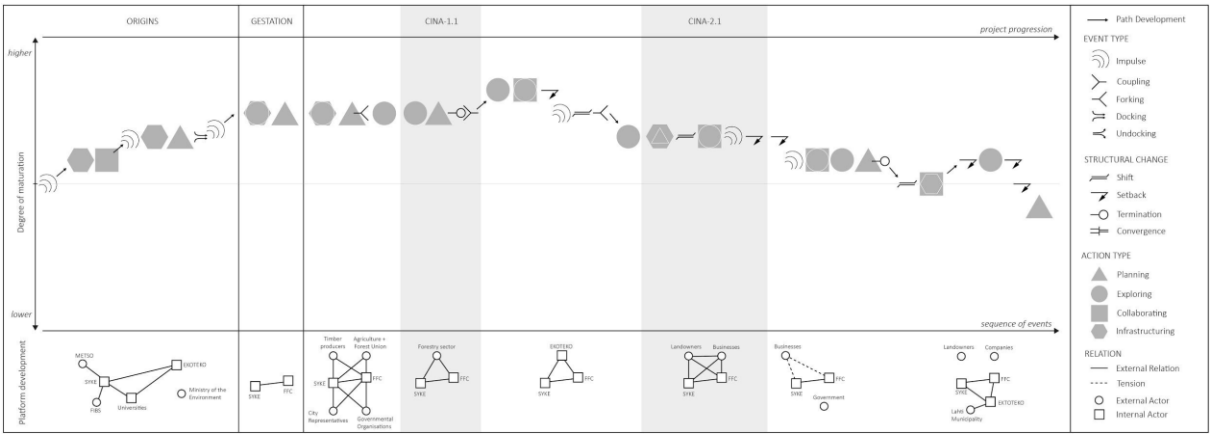
Biodiversity and most of the ecosystem services provided are to some extent public goods. Ecological compensation shifts the payment responsibility to the actors who cause loss. Yet the developments so far suggest that for these potential societal, economic, and ecological benefits to be realised, demand for compensation offers has to increase. The currently voluntary nature of the Habitat Bank does not appear to generate sufficient pressure for private entities to engage.

Two things are thought to change that: transparent and convincing rules for evaluating biodiversity loss and associated restoration activities under a compensation scheme, as well as clarity on the government's future compensation policies.

Lessons learned:

- Openness is important at all steps of the biodiversity offsetting process
- Common rules or guidelines are needed, but do not yet exist
- Willingness to go forward in biodiversity offsetting needs a push – regulation or (more) political action

Innovation Journey



Source: Loft et al. 2020/ D 4.3; Full record on Innovation Journeys can be accessed here: https://innoforest.eu/repository/d4-3-overview/

Figure 14 IR Finland - Lessons Learned

A.2 IR Germany – Forest shares for carbon sequestration

The German IR is implementing a compensation scheme that strives to offset CO2 emissions through the planting of so-called 'climate forests'. The idea was established in 2007 by the State Ministry for Agriculture and Environment and the tourism association of the federal state of Mecklenburg-Vorpommern, as well as the State Forestry Management Agency. Certificates – 'forest shares' (German: "*Waldaktie*") – are sold on a voluntary basis and used to fund tree plantings on previously non-forested, publicly owned land with a mix of species, most of them deciduous. In addition to sequestering carbon by growing trees, the IR also aims to use 'planting days' to raise awareness about the need to compensate carbon emissions and the role of forests in doing so. Originally, tourists were targeted as the primary buyer of forest shares to compensate for their vacation related emissions. Though over time, a corporate buyer has become the primary customer, with about half the certificates purchased by locals and tourists.

Stakeholder network

The original actors who established the Forest Share continue to form the core of the initiative and are involved in the ongoing development of the compensation scheme. With joining InnoForESt, this group of central actors has been expanded to now also include the 'Academy for sustainable development Mecklenburg-Western Pomerania' (*Akademie für Nachhaltige Entwicklung Mecklenburg-Vorpommern* (ANE)), an NGO who manages the transactions, as well as InnoForESt science partners, and a local energy provider who is the main business client. Given that the original target group – tourists – are no longer the major buyer of certificates, the tourism board has expressed the desire to reduce its involvement. Not the least because of difficulties justifying the use of board capacities for a certificate that is primarily used by a private corporation.

Payment mechanism

In the early days, forest shares were sold largely face to face in hotels in the region, or online for 10 €/m^2. Shortly before joining InnoForESt, the price was doubled, in part because of growing difficulties finding land for climate forest plantings. Still, this represented a symbolic pricing, as it does not cover the costs of planting climate forests and maintaining them long term. So far, the forest shares have been realised with public support: initiated by a state ministry, plantings have taken place on public land, with support from the state forest administration who provided land, implemented the plantings and ensured their maintenance afterwards. Currently, sales of certificates and plantings have stopped due to the lack of available land. For a financially feasible continuation to plantings, forest shares would have to be priced at between 60€ and 85€/m^2. IR practitioners expect that the future of the forest share depends, at least in part, on the government setting a price for CO2 emissions. In their view, only with this kind of government-set conditions can a voluntary tool like the forest share operate long term.

A recent move by the local state government to start its own initiative to plant a million trees as part of a climate change mitigation effort will likely impact the forest share negatively, as the government's initiative has been set up independent of the forest share.

Potential implications for forest management and FES provision

The climate forests resulting from the forest share compensation scheme are planted on previously unforested land. Both the choice of tree species and management activities aim to maximise carbon storage, which includes a commitment to maintain the forest for 200 years, which is when these trees are expected to reach their maximum CO2 storage capacity. The FES at the center of this IR is carbon sequestration in newly planted and growing trees. However, IR practitioners point out that the resulting 'climate forests' are also expected to have beneficial effects on biodiversity and water quality. Neither impact (CO2, biodiversity, or water) is currently monitored.

The forest share also has the objective of raising awareness about climate change, and the forest's role in mitigation efforts. This also explains why the price per forest share is in no relation to the actual forest management costs, and the sequestration potential purchased with each share is unrelated to the cost of CO2 mitigation traded in markets. However, the educational impact of participating in a forest planting event or merely purchasing a forest share is impossible to measure.

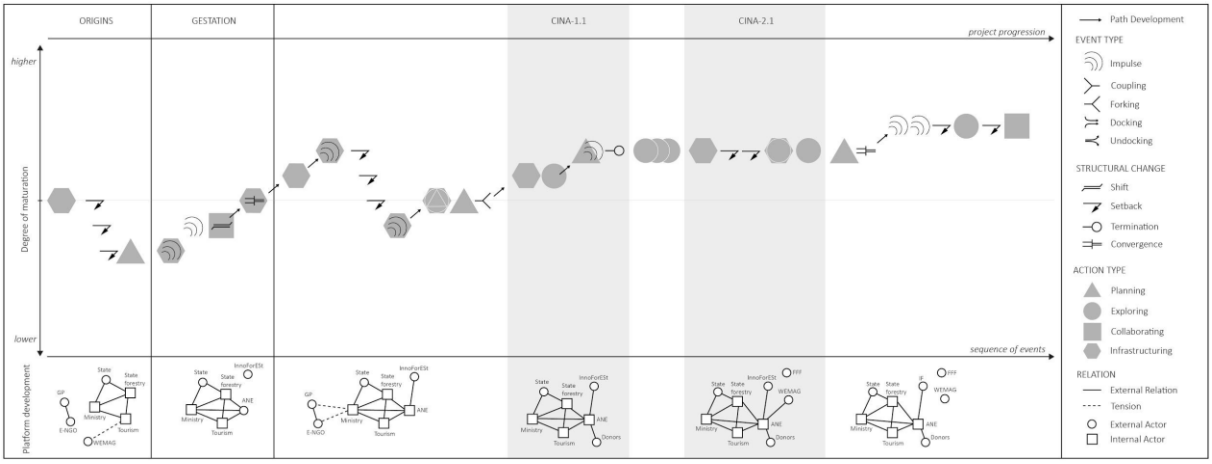
Outlook

The state government of Mecklenburg Western Pomerania is working with ANE to develop an instrument that would allow both more tree planting as well as pursuing the educational goals of the forest share. The negotiations between the state government and ANE have started recently, with the timeline and ultimate outcome currently open.

Lessons learned:

- Mix up the stakeholder's setting by asking new questions
- Spend time to allow identification with new goals
- Verify your real access to all essentials of your product to be developed

Innovation Journey



Source: Loft et al. 2020/D 4.3; full record on Innovation Journeys can be accessed here: https://innoforest.eu/repository/d4-3-overview/

Figure 15 IR Germany - Lessons Learned

A.3 IR Czech Republic & Slovakia – compensation for sustainable forest management

Two self-organised, common property forests are at the center of the Innovation Regions in the Czech Republic (CZ) and Slovakia (SK). Historically, both have served the purpose of providing fuel and timber to members of the local community. In SK, members of the local community have owned the forests collectively for centuries. In CZ, the community bought the forest 20 year ago from private owners and the state, who had used the forest primarily for timber production (spruce monocultures). With changing demographics and altered society-forest relationships, the expectations towards and uses of these forests has changed recently. Today, both IRs aim to balance individual and societal interests, including timber production, climate regulation, biodiversity, recreation, and education through innovative governance mechanisms. The goal is to develop continuous sources of funding for sustainable multipurpose forest management that supports resilience, biodiversity, and community well-being.

Different FES are at the center of the IRs in the Czech Republic and Slovakia. In the Czech Republic, a non-governmental land-trust (Cmelak) focuses primarily on nature conservation and biodiversity. It was established in 1994 in order to restore mixed forest damaged by bark beetles in Jizerske Mountains and to cultivate a variety of tree seedlings. Ecosystem restoration has been the main focus so far implemented by buying and transforming spruce monoculture forests into 'new virgin forests'. Funding for these activities comes from donations, public grants, and cooperation with companies, and since 2004, the sale of 'biodiversity patronage certificates'. In addition, the land trust has developed educational programmes aimed at school children and tourists to help fund their activities. The actual implementation (planting etc.) has in large parts been based on volunteer work, particularly in the beginning. According to the InnoForESt scientists and partners working in the region, these past efforts to continuously improve the Cmelak initiative and uncover new funding mechanisms have been driven by a few motivated individuals eager to transform the community forest into a more natural state. The FES pursued - biodiversity - has remained the same throughout the entire project time.

For the forest commons Hybe in Slovakia, timber production has been and continues to be a primary objective, and provides funds for various community projects. Yet, income generated from timber is expected to decrease in the coming decades due to increased calamity logging in the recent past. At the same time, severe storm damages have triggered a change towards more close-to-nature forest management practices, and local residents increasingly demand non-timber FES, particularly recreation. To compensate for the expected loss of income, carbon sequestration certificates or other PES related to carbon forestry activities are considered as potential sources of forest revenue in the future.

Stakeholder network

Stakeholder networks had been established in both the Czech and Slovak part of the IR even before joining InnoForESt, and forest management had started moving towards more sustainable practices (see above). InnoForESt activities have strengthened these existing stakeholder relationships and facilitated discussions about potential payment mechanisms for continuous funding of biodiversity protection (Cmelak) and sustainable forest management (Hybe).

Cooperation among stakeholders has increased and generated enough momentum for a group of stakeholders to plan lobbying for specific policy changes that would require compensation payments for carbon offsetting, as well as political support for regulating ungulate populations and thus support sustainable forest management practices.

Payment mechanism

The Cmelak New Virgin Forest initiative has experimented with funding their operations through the sale of voluntary biodiversity patronage certificates. As these sales decreased, and remained one-time only purchases, Cmelak has considered offering carbon offsetting certificates instead, as these were deemed more likely to trigger repeat purchases. Along with the declared purpose of the certificates (biodiversity vs. carbon), discussions about the voluntary or obligatory nature of compensation payments evolved; in the first CINA workshop facilitated by InnoForESt, participants discussed three scenarios for funding FES provision, including:

1. **Regulation** focusing on environmental protection, **compensating** forest owners for opportunity costs of not practicing more intense forest management. The source of funds is not clear yet.
2. **Market** but **with certification of forest management** and products to ensure environmentally friendly management and regional wood use
3. **Hybrid ecosystem service governance using voluntary payment schemes**, for example, for CO2 sequestration based on self-organisation and self-regulation by local communities; the community will determine the purpose of the payments, the price for the services and goods provided as well as decide about carbon forestry practices. Potential buyers: tourists, local business, wider public.

Early on, the third option was the one favored by stakeholders. Though over time, discussions evolved to focus on a combination of scenarios 1 and 3 - the development of a governmental payment for ecosystem services scheme that compensates forest owners for a diversity of non-production FES such as biodiversity loss and carbon offsetting. A group of stakeholders intends to lobby for this goal among regional and national policy-makers (Ds4.2, 6.2, workshop survey).

(Potential) implications for forest management and FES provision

In Cmelak, the link between the innovative governance mechanism and its impact on forest management and FES provision is fairly direct – the sale of carbon or biodiversity certificates pays for restoration activities, which enhance the provision of FES, primarily biodiversity, as well as water protection and more. Creating 'new virgin forests' has been - and is expected to continue to be – the guiding management objective. In Hybe, the aim is to support timber oriented sustainable forest management practices that have been practiced for several years now. So far, the current level of FES provided is therefore expected to be maintained.

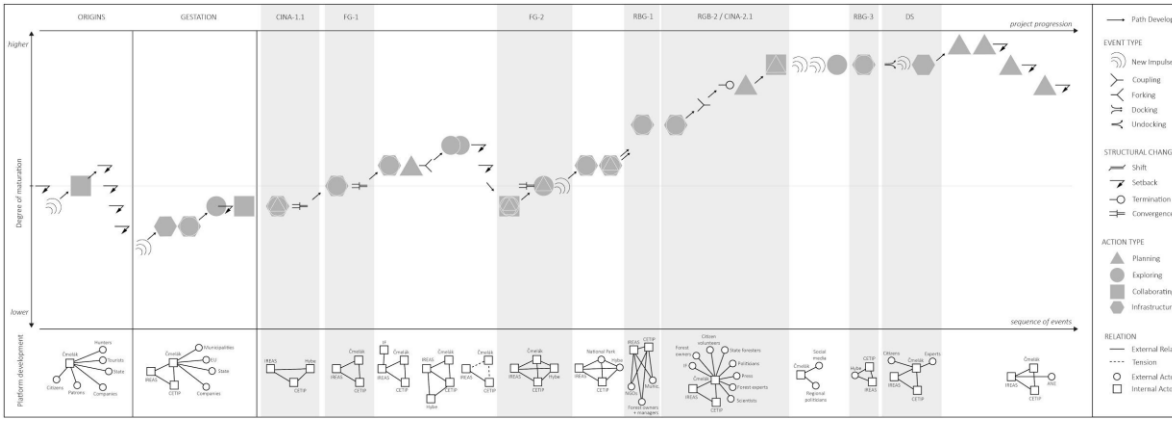
Outlook

Both Cmelak and Hybe are interested in implementing a more systematic close-to nature forest management with emphasis on carbon forestry in the future. The currently widespread bark beetle disturbances in both countries are seen as a potential opportunity to implement and promote sustainable forest management practices on a larger scale, including a more systematic approach to carbon forestry. With increasing public awareness, the hope is that public funding will become available and put an emphasis on non-provisioning, i.e. non-timber FES. The IR has concluded that securing FES provision and financing in the future demands a combination of government support in the form of a payment for ecosystem services scheme targeting non-provisioning FES. Self-organised communities like those involved in InnoForESt should be closely involved in designing these government programmes. The latter have proven to be innovative in their forest management practices and better able to adapt to changing societal demands (Ds 4.2, 6.2). At the same time, offering compensation certificates in the context of an established compensation standard may increase credibility and trust in the payment for ecosystem services schemes.

Lessons learned:

- Communities can come together and carry out a project much more quickly due to their flexibility in thinking and discussions
- Ability of self-organised communities to resist social and natural disturbances is a key factor for enabling the innovation
- Within the community there should be a strong and enthusiastic leader with a clear vision about the project and its future
- Awareness raising/campaigns to engage the public are very important
- Be in touch with public authorities as they can help or hinder the innovations

Innovation Journey



Source: Loft et al. 2020/D4.3; full record on Innovation Journeys can be accessed here: https://innoforest.eu/repository/d4-3-overview/

Figure 16 IR Czech Republic/Slovakia - Lessons Learned

IR Italy – Forest pasture management for scenic beauty and biodiversity conservation

The Primiero Region in the Autonomous Province of Trento has a long tradition of managing mountain forests and pastures for multiple biological production purposes and the provision of ecosystem services, focusing in particular on the maintenance of pasture, slope stability, water retention, as well as timber production. In light of land abandonment, particularly of mid-elevation pastures, due to demographic change, innovative mechanisms are needed to maintain that balance in the future. The management of the forest-pasture system is crucial to the tourism industry as the balanced mix of healthy forests and pasture areas creates a landscape that is greatly appreciated by visitors. Tourism, in turn, is a vital source of income in the region. To continue meeting multiple societal demands while being financially sustainable, the Province of Trento administration aims to engage a broad stakeholder base. With the help of bottom up support and engagement, the aim is to generate a common view on cultural landscape management objectives, develop new financing mechanisms, and mobilise landowners to manage their property within the larger landscape and ecosystem service context.

The IR enjoys a supportive political climate. Over the past two years, a new regional government has encouraged public participation in discussions about landscape services. Thus, the efforts within InnoForESt do not take place in a vacuum but rather happen in a context in which stakeholders may already be sensitised with land management issues as well as their potential roles as active stakeholders in land management decision processes. In addition, policies introduced in the summer of 2020 at the national level provide significant amounts of funding for landscape restoration targeting the maintenance and or creation of forest pasture mosaics at a landscape scale. Thus, both provincial and national level policies now support forest pasture management and provide resources to land owners for restoration measures, making it more likely for the goal of maintaining FES to become reality.

Stakeholder network

Prior to joining InnoForESt, active cooperation and networks existed between relevant actors. The local IR practitioners organised a number of well-attended CINA workshops as well as additional meetings and excursions with local stakeholders on topics of forest pasture management. Nevertheless, they report no noticeable effect on stakeholder collaboration as of yet except the consolidation of the existent network and raising-awareness on the importance of the multi-functionality of the forest as the only condition to re-launch the economic development of the mountain communities, by the integration of tourism development with the rural environment.

The IR has also been in touch with neighboring provinces interested in pursuing a collaborative stakeholder engagement process for landscape restoration as well. Last but not least, the government has become interested in the IR's effort to build stakeholder networks around the issue of forest pasture management and may draw on its experience in its drafting of the 'mountain forestry plan'. Once approved, it may help support a rural economy, through simplified bureaucratic processes and systematic identification of wooded areas, including those destroyed by Vaia storm, to be potentially transformed into pastures and meadows, in order to sustain the maintenance of open forest pasture landscape mosaics.

Payment mechanism

In the past, restoration measures were covered by public funding (EU rural development funds, provincial Landscape Fund) that have largely been discontinued. Throughout the time that the IR has been involved in InnoForESt, it has tried to identify alternative sources of funding. One main idea was to introduce an additional tourism tax that would serve to pay for restoration measures, though this was not supported by the tourism sector. Following a severe storm event in the fall of 2018, the provincial Landscape Fund was reinstated to cover the costs of extracting fallen trees and quickly replanting hill slopes critical for erosion control. Yet, in the IR practitioners view, a combination of public and private funding for landscape restoration, including maintaining forest pastures, is key to sustaining FES provision in the long term.

IR partners have indicated that one step towards developing a payment mechanism that supports forest pasture maintenance in the long term is to have a system of monitoring the quality of pastures that could be easily applied and used in everyday practice by forest service officers. Closely related, they view the success of their initiative to be closely linked to the ability to calculate the economic impact of FES provision for land owners.

(Potential) implications for forest management and FES provision

Alpine settings like that of the IR tend to have a particularly high level of a diversity of forest ecosystem services provided. This is in part a result of the fact that the mountain environment limits the opportunities for alternative, large-scale uses of natural resources, for example, steep terrain prohibits large scale development (see also Geneletti et al. 2019/D2.2). Largely, the focus in these regions is thus on maintaining the already relatively high level of FES provision, rather than improving the level of FES provision.

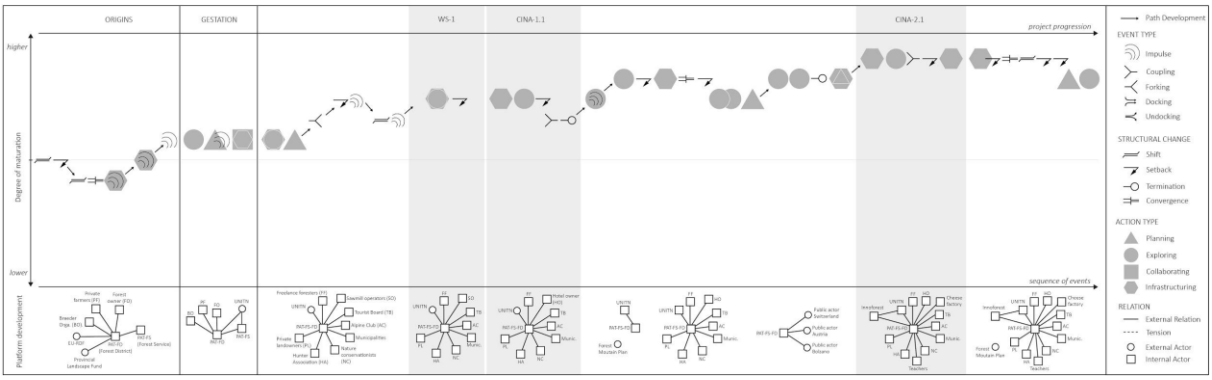
Outlook

Overall, forest management practices in the IR are not expected to change significantly because of the involvement of additional stakeholders. While there is room for some adaptation – for example, to consider the use of certain forest roads for recreational purposes – stakeholders have confirmed their satisfaction with forest management practices and focused discussions on developing innovative funding mechanisms for management on public and private land and supporting private landowners in actively managing their interspersed parcels. Combined, this landscape approach to forest and pasture management is expected to halt the further loss of FES and secure a future sustainable provision or restoration of a diversity of forest ecosystem services on a landscape scale, particularly cultural FES, as well as biodiversity conservation. The public forest administration has played a key role in the success of this endeavor so far and is expected to continue to do so in the future.

Lessons learned:

- To build networks and collaborations
  - to involve local policy (municipalities, local public officers) which has direct contact with local actors;
  - to identify a leader among the stakeholders which could lead the development of concrete actions.
- **To enhance bottom-up process**
  - to find interconnections with ongoing political process;
  - to gain the support of political figures.
- **To trigger the innovation development**
  - public resources are crucial as first step to drive the change;
  - collaboration with scientific partner to provide effective systems to evaluate economically the FES.

Innovation Journey



Source: Loft et al. 2020/D4.3; full record on Innovation Journeys can be accessed here: https://innoforest.eu/repository/d4-3-overview/

Figure 17 IR Italy - Lessons Learned

A.4 IR Austria - regional forest-wood value chains for FES provision

Located in a forest-rich, mountainous area in central Austria, the IR 'Eisenwurzen' aims to increase the region's socio-economic and ecologic resilience by strengthening stakeholder networks around the creation of innovative wood-based products and/or forest-based services. Increasing exchange and collaboration between diverse stakeholders along the wood value chain (forestry, public administration, regional planning, tourism, and traditional craftsmanship) is expected to support local employment and attract young professionals to the region. At the same time, using local forest resources, particularly hardwood from broad-leaved species and autochthonic softwood species, can create an incentive for restructuring forests in the region towards more diverse, mixed species stands. These in turn are more resilient to climatic changes and better able to protect citizens and infrastructure from rock fall, avalanches, and floods.

Stakeholder network

Before joining InnoForESt, an informal network of stakeholders representing local businesses and tourism administration, as well as the rural development sector was in place. The stakeholder identification and network events facilitated by STUDIA - the local non-profit organisation partnering with InnoForESt - reached around 120 local actors, 87 of whom actively participated in events and workshops. Participants mainly represent local wood-based businesses and trades, as well as the tourism and regional development sectors. Through this process, a core group of stakeholders has formed who are interested in continuing to work collaboratively on developing innovative business ideas based on wood and the local forest environment that support the local economy as well as sustainable forest management.

Payment mechanism

Developing a funding mechanism for FES provision is not the expressed goal in this IR. Instead, the aim is to establish and promote an economically viable forest-wood-value chain that – by using regionally sourced timber – supports sustainable forest management practices and FES provision, including biodiversity conservation, forest education, eco-tourism, and recreation. In practice, much of the wood being processed is not sourced regionally due to pressure to price the end product competitively. In a globalised timber market, timber imports are low cost alternatives to regional supplies. However, there are examples that show linking FES provision and regional development is possible: for example, a business that has developed an innovative wood flooring product based on regionally sourced hardwood (beech) or the plan to build a business on processing regional hardwood (see also Maier and Grossmann 2019/D6.3).

(Potential) implications for forest management and FES provision

Many innovation ideas so far have centered on the production and marketing of wood-based products, not on forest management practices or currently non-marketable FES. Any link to FES provision or forest management remained indirect. Yet, forest-wood-based regional development does not automatically imply a benefit for FES provision. Bringing this interconnection to life requires conscientiously integrating FES provision as an objective into stakeholder network building processes and targeted design and monitoring of common projects.

At the same time, STUDIA AUSTRIA is in contact with forestry stakeholders and the networking activities have laid important groundwork to generate economic benefit for the region through improved and new forest-wood value chains by connecting different stakeholders around the idea of using local forest resources and knowhow in innovative ways. Even during the project's lifetime, the strengthened stakeholder network appears to have encouraged activities in the region that may serve both regional economic development and FES provision, for example, a proposal to establish a sizable timber processing facility specialising in hardwood (beech) lumber and residue-based energy production in the region. Several key actors involved in the initiative have also participated in workshops and discussions facilitated by InnoForESt, or the IR practice partner STUDIA AUSTRIA. Given the focus on hardwood species, such an initiative may provide an incentive to forest owners to convert their forests into more diverse, mixed species forests, which in turn may hold benefits for FES provision or at least support this conversion economically in the long term. In addition, such a wood processing facility could complement efforts to strengthen local wood processing and construction businesses. Hence, it may offer a link between regional socio-economic and ecological resilience. As such, the development of networks among stakeholders of the forest-based sector can be seen as small, but important first steps of a bigger and longer process towards sustainable FES provision in the wake of sustainable and species-diverse timber production in mountainous forest. While the individual product is hardly going to have a significant impact on FES provision directly, the developments made possible by the social networks built and the momentum generated may well become crucial in guiding future developments within the IR towards a vision of social-ecological resilience.

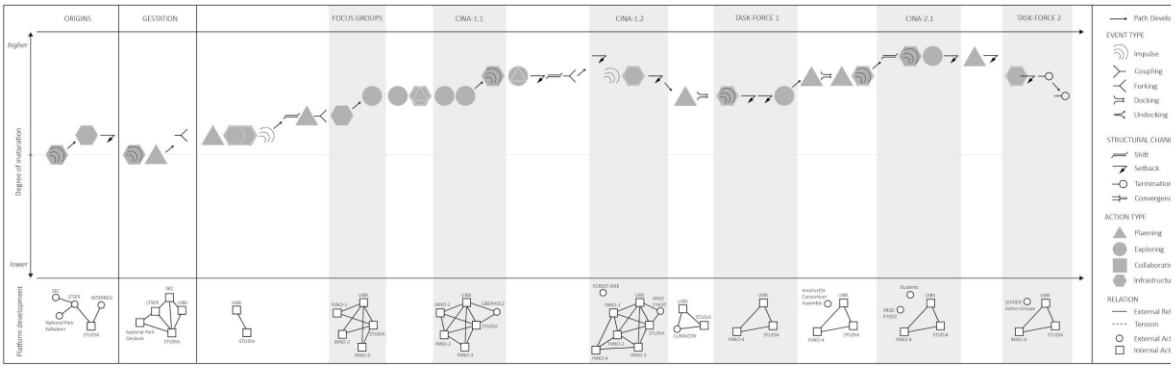
Outlook

Linking the regional forest-wood value chain more strongly to forest management and FES provision will be key to moving from a regional development focus to one of social-ecological resilience and FES provision. Bringing this interconnection to life requires conscientiously integrating FES provision as an objective into stakeholder network building processes and targeted design and monitoring of common projects. Doing so on a larger scale will continue to require the support of a regionally well-connected intermediary like STUDIA who can facilitate the necessary network building among stakeholders of the forest sector and sensitise for the significance of FES in the region and the potential role wood-based businesses can play in securing their provision.

Lessons learned:

- Cross regional and sectoral exchange is attractive.
- Platforms can generate innovation in forest & wood value chains, even when they may decouple.
- Platforms for FES are predominantly a public good.

Innovation Journey



Source: Loft et al. 2020/D4.3; full record on Innovation Journeys can be accessed here: https://innoforest.eu/repository/d4-3-overview/

Figure 18 IR Austria- Lessons Learned

A.5 IR Sweden 'Love the Forest'

The Swedish IR focuses on educating school children about forests and the use of forest resources. The aim is to disseminate facts and fascination about the Swedish forests and encourage students to visit the forest more often. Young people are thereby offered the opportunity to reflect on how the Swedish forests are currently used and can be used differently in the future to achieve a more sustainable world and contribute to climate change mitigation (see also Aukes et al 2020/D4.2). The initiative is implemented by UNIVERSEUM science center in cooperation with partners from the forestry sector, including large forest owners, forest owners associations, and state forest agencies.

The programme 'Love the Forest' is based on an established educational model called "Young people speculate", which has been applied by UNIVERSEUM in the past to teach children about a variety of natural resources and related topics, including one application focused on FES (Love the Forest 1.0). During the programme, elementary school students meet the cooperating partners from the forest sector and are invited to express their visions and ideas about the Swedish Forests and showcase how they see forest resource use in the future. The main activity is a competition in which the classes develop a project idea around innovative and new uses of forest resources and the forest itself, which they then present to the different representatives from industry, academia and the public.

Stakeholder network

Before joining InnoForESt, the partners of this IR included forest companies, regional public partners and associations. Working with InnoForESt, this list of stakeholders has been expanded to also include regional and local administrations, as well as forest and non-forest actors with an interest in climate change mitigation and adaptation. In addition, the main target group of the educational offers have expanded as well; starting out with elementary school children, high school level students have come into focus.

Payment mechanism

The love the forest programme has thus far been funded by payments from forest-based companies in the context of their corporate social responsibility (CSR) commitments. This funding base has been expanded during the IR's involvement in InnoForESt; funding for education on climate change related issues now also comes from non-forest based businesses as part of their CSR.

(Potential) implications for forest management and FES provision

There is not one particular FES at the center of this innovation. Rather, this IR focuses on school children learning about the diversity of forest ecosystem services, forest management and forest products. There is no direct or indirect link between the innovation mechanism, forest management and FES provision. Forest management is not affected by this innovation, neither is the provision of FES.

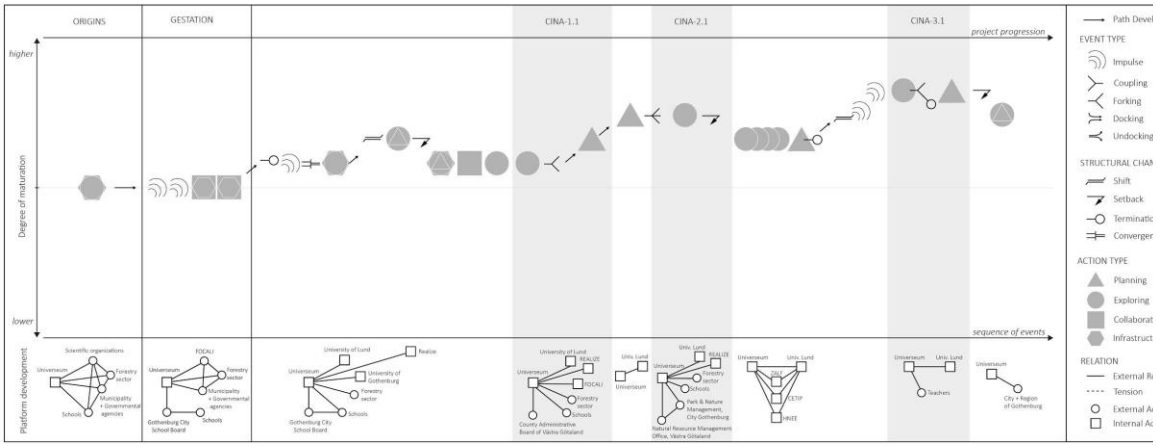
Outlook

The IR is planning to expand its 'Love the forest' offer to high school students (age group: 13-16 years old) with the aim of increasing knowledge of what causes our climate problems, what methods we use to gather data on climate impact and the importance of trees and forests for the climate and how climate change threatens forests in Scandinavia.

Lessons learned:

- **Urgent subject:** The importance of the role of the forests and their ecosystem services in relation to climate change has been increasingly recognized by different levels of society. This has led to a demand for projects that aim to increase the awareness about these socio-ecological systems.
- **Transdisciplinarity**: The close collaboration between the implementer of the project (Universeum) and the science partner (LUCSUS) has been crucial for the development of the innovation.
- **Structured process:** Systematic application of a range of methods in our Innovation Region helped identifying and analyzing different development options. Further it contributed to constructive discussions with stakeholders (even when topics were complex or sensitive).

Innovation Journey



Source: Loft et al. 2020/D4.3; full record on Innovation Journeys can be accessed here: https://innoforest.eu/repository/d4-3-overview/

Figure 19 IR Sweden - Lessons Learned

B Templates used during a Consortium Annual Meeting 2019

Work Package No: __

Governance Innovation for Forest Ecosystem Services Provision

ACTIVITIES	Outputs	SUPPORT FOR FOREST ECOSYSTEM SERVICES PROVISION	
Which of your **activities** have enabled the IRs to address the provision of different FES?	Which **practitioners** (entrepreneurs, foresters, others) have been supported by these activities in enhancing the sustainable provision of FES in the Innovation Regions? How have the activities supported them? WHOM? HOW?	What are the **individual (sub)-outputs** of your work package's activities identified as helpful for financing, enhancing, or upscaling FES provision by the IR?	Whom and how can these **outputs support** the sustainable provision of FES in Innovation Regions and elsewhere in the future? WHOM? HOW?
Please also list **activities** that were **identified as not helpful** in addressing FES provision.		Please also list **outputs** that were identified as **not helpful** in addressing FES provision.	

InnoForESt and beyond – please think of InnoForESt and other influencing factors when answering the following questions for your work package

What do you think an **entrepreneur** looking for new ways to finance or market his/her forests' FES can take away from your experience?	What do you think a **forest owner** looking for new ways to finance or market his/her forests' FES can take away from your experience?	What kind of **political support at a regional or national level** is needed for securing FES provision?	What kind of **political support from the European Parliament** is needed for securing FES provision?

Innovation Region:___

Governance Innovation for Forest Ecosystem Services Provision

INNOVATIVE GOVERNANCE	FOREST ECOSYSTEM RELATED TARGET		IMPACT ON FOREST ECOSYSTEM SERVICES PROVISION
What is the **governance innovation** in your Innovation Region?	**Which FES** is/are addressed by the governance innovation via the output/product?	What is your governance innovation's **FES-related target**? *(see grey box below)*	What are suitable **indicators** to measure the governance innovation's **impact on forest ecosystem provision in the short** (InnoForESt's duration), **medium** (5 years after InnoForESt) **and long term** (5-10 years or more after InnoForESt)? short term / medium term / long term
What is the **output or product** resulting from the governance innovation?			

a) Halt a loss of FES
b) Increase FES provision (more of the same or additional other FES
c) Contribute to the economic sustainability of forest management explicitly addressing FES
d) FES provision at an economically interesting scale
e) Support regional development (jobs/income opportunities) on the basis of FES
f) No direct link to FES provision (yet) – please describe indirect link
g) Other – please describe

InnoForESt and beyond – please think of InnoForESt and other influencing factors etc. when answering the following questions for your Innovation Region

What kind of **support or condition has been most valuable** so far in the process of securing FES provision (both from InnoForESt and beyond)?	What **kind of additional support is needed** to enhance the provision of Forest Ecosystem Services (further) in the future?	What do you think an **entrepreneur** looking for new ways to market his/her forests' FES can take away from your experience?	What do you think a **forest owner** looking for new ways to market his/her forests' FES can take away from your experience?