

Using Process Net-Map to analyze governance innovations in the forestry sector

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ABSTRACT

This study focusses on the analysis of governance innovations to promote the provision of forest ecosystem services framed as social innovations. Social innovations can refer to any solution that addresses a social or environmental issue and that creates social relationships in the process leading to new types of collaborations among actors. Up until now, it is not well known how exactly such processes are initiated and maintained over time. Against this backdrop, an analysis is conducted for three European cases of such governance innovation processes in Finland, Germany, and Sweden. The Process-Net-Map is employed for data collection and analysis with the aim to map the innovation process against a timeline in terms of all relevant events and actors, also marking the challenging and positive moments in the process. Results highlight on similarities and differences between the analyzed cases in regard to the typical roles that actors assume for the initiation and continuation of the innovation process over time and the identification of typical types of so-called action situations, in which actors interact with each other throughout the process. Furthermore, the criteria which interview respondents use to define success and failure of the innovation process are investigated and compared across cases.

1. Introduction

Forest ecosystems cover a substantial part of the terrestrial surface in many countries and globally (FAO, 2020). In Europe, roughly 35% of the land area is covered by forests which equals about one quarter of the global forest area (Forest Europe, 2020). Forests represent highly dynamic and complex social-ecological systems, where tightly interrelated social and ecological processes often occur across different governance levels and spatial scales (García et al., 2020). They provide numerous forest ecosystem services (FES) beneficial to a variety of social actors (Amacher et al., 2014). These FES include not only provisioning services (e.g. wood, timber, and fiber) as commodities for which markets exist, but also regulating (e.g. climate, water cycling), cultural (e.g. education, landscape aesthetics), and supporting (forest habitat and biodiversity) services as non-commodities, for which markets or quasi-markets mostly are still missing. This is due to the fact that many non-provisioning FES show the characteristics of environmental public goods, where potential beneficiaries cannot be excluded from their consumption (Vatn, 2015). This generates only little incentives for potential FES providers, such as forest owners and managers, to engage for their provision, often leading to their under-provision, although there is critical societal demand for

them (Krieger, 2001). If the provision of such FES should be improved to the benefit of different social actors, innovative governance solutions are called for, which also adequately reward the actors who engage for the increased provision of public good-type FES.

Such innovative solutions can occur in the form of so-called payments for ecosystem services (PES). PES are defined as voluntary transactions between an ecosystem service (ES) provider or seller (i.e. a land owner or manager in the position to generate ES), and an ES buyer (i.e. either a direct beneficiary of the generated ES or another actor, such as the government, who pays on behalf of the beneficiaries), where payment often is made conditional on the delivery of the agreed ES, which typically represents a public good with no functional market (Sattler and Matzdorf, 2013; Wunder, 2005). Besides ES provider and buyer, often third parties are involved who take on additional tasks such as assisting in the PES negotiation, environmental monitoring, or administration of payments (Matzdorf et al., 2014; Sattler et al., 2013). Challenges attached to the design of effective PES, amongst other things, include ensuring additionality (i.e. not only maintaining the environmental status-quo, but actually encouraging a plus in ES provision compared to the initial situation), preventing spillover effects (i.e. safeguard that environmental degrading activities are not simply

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dislocated to other areas not involved in the PES), and assuring overall policy coherence (i.e. making sure that the PES makes sense with other already existing policy frameworks) (ibid).

Despite the existing challenges, PES are frequently discussed as a viable alternative to hierarchical command and control or community-based governance approaches, to address market failure and environmental externalities (Matzdorf et al., 2013; Vatn, 2015, 2010). PES, thus, can help to fill a functional governance gap and bring together diverse governance actors who engage for their design, development, and implementation.

To this effect, PES can be interpreted as examples of social innovations (SIs), where multiple social actors act together in order to find a creative solution to a given problem which result in social benefits (e.g. Ludvig et al., 2018; Milley et al., 2018; Rösing Agostini et al., 2017). SIs can broadly be defined¹ as solutions “that meet a social or environmental issue, create social relationships in the process, and imply new types of collaborations” (Tomos, 2020). Although the concept of SI is not new it was only sparsely utilized until the twenty-first century (Ayob et al., 2016). Nowadays, SIs studies have become quite prominent on the research agenda in the face of the numerous societal challenges of our time, such as climate change, biodiversity loss, or the progressing degradation of ecosystems worldwide (cf. Tomos, 2020). Nevertheless, it is still not well known, how SIs emerge and develop over time (Milley et al., 2018), and the process of SIs remains understudied (Mulgan, 2006). Also, studies on SIs have mostly focused on individual cases, rather than investigating common patterns across cases (Mulgan, 2006).

Against this backdrop, the aim of this study is to gain a better process-based understanding of social innovations by analyzing and comparing SIs in the context of governance innovations aimed to promote the provision of different FES. In the analysis, a particular emphasis is given to the involved governance actors and the sequence of events in the innovation process, where the latter can be grouped into different types of action situations through which actors interact with each other. Gained insights into generalizable patterns across analyzed cases may be helpful to inform other studies on FES governance, in particular for which roles actors have to be won over or in what types of interactions actors have to engage to initiate and sustain an innovation process.

Actors can be single individuals (e.g. public servants, private entrepreneurs, citizens), groups of individuals (e.g. a farmers' group, a citizen grass root initiative, etc.), or formal organizations (e.g. government agencies, companies, environmental NGOs), who are engaged from the public, private, or civil sphere of society (Lemos and Agrawal, 2009). These actors can have very different motivations to be engaged, exert contrasting levels of influence in decision making processes and seek to obtain various benefits.

Action situations are then defined as any situation where actors make collective choices or decision (McGinnis, 2011). Such action situations are still often considered a ‘black box’ (McGinnis, 2016:9), so identifying through which typical action situations the involved actors interact can generate new insights about how innovation processes unfurl. It is also often of interest at which governance levels, either local (e.g. city or municipal), regional (i.e. state), national (i.e. country), or international (e.g. European) level, the interaction takes place in a multi-level-governance context (Newig and Fritsch, 2009). Furthermore, it is of importance for this study to clarify if similar action situations can be identified for cases that are in different development stages, i.e. comparing still young vs. more mature innovation processes.

Altogether three European cases as examples for governance innovations to promote FES provision are analyzed in this study. The following research questions (RQ) are addressed:

RQ1: When and how did the innovation process in each case emerge

and develop over time, with a particular focus on the sequence of events and the involved actors?

RQ2: What can be learned from a comparison of all three cases in regard to the different roles that actors assume during the innovation process?

RQ3: What can be learned from a comparison of all three cases in regard to how different events represent typical action situations in which actors interact throughout the innovation process?

RQ4: Which criteria are used to define success and failure of the innovation processes and to what extent are there commonalities between the three cases?

The remainder of the study is organized as follows: In Section 2, the three selected cases are briefly introduced and the Process-Net-Map method is described. In Section 3, the results in view of the posed research questions are presented. In Section 4, the results are discussed in light of other studies and the pros and cons of the applied method are reflected upon. Section 5 concludes and outlines possible avenues for future research.

2. Data and methods

2.1. Selected cases

All three cases were pre-selected in the context of the project ‘InnoForEST’ (www.innoforest.eu), an innovation action funded through the European Union’s Horizon 2020 program. From the overall six cases of the project, a sub-set of three was chosen for this study: i) Habitat bank, Finland, ii) Forest share, Germany, and iii) Love the forest, Sweden (Table 1). Their selection was based on three criteria, with the aim to cover contrasting cases in view of: i) the governance level (national vs. regional vs. local), ii) the development stage (adult vs. childhood vs. baby stage), and iii) the targeted FES categories (supporting vs. regulating vs. cultural). Despite these differences, all selected cases constitute examples of PES with different actors involved as FES providers (or sellers), FES buyers, and FES beneficiaries.

Furthermore, all three selected PES cases can be framed as SIs. Following Ayob et al. (2016), who conducted an analysis on the evolutionary development of the concept of SIs and how it ‘came to be’, identified three broad outcomes from SIs: They create social relations, societal impact, and technological innovations. For the cases selected for this study, the first can be confirmed by the numerous actors involved from the non-profit, government, and business sector in each case (cf. Ayob et al., 2016), who cooperate across multiple governance levels in order to bring about change. This aspect is also addressed by Rösing Agostini et al. (2017) who emphasize the importance of ‘unusual partnerships’ to make innovations happen. The second aspect, societal impact, can be confirmed by the efforts undertaken to realize improved FES provision for different societal actors as the direct beneficiaries and society as the general beneficiary of environmental public goods. However, the third aspect, technological innovations, in the narrow sense (e.g. like the vacuum cleaner as a classical example, which has made household chores easier, cf. Smeds et al., 1994) is not in the focus of the analyzed cases, but rather innovations in the form of new governance solutions to boost provision of specific FES. Furthermore, there is also an argument made that new social relations can be seen as an innovation themselves (e.g. Live Aid as a new alliance between the music industry and famine relief initiatives, cf. Westley, 1991). Mumford (2002) then lists three additional typical elements for SIs: new ideas, organized social interactions, and the achievement of common goals, which all align with features of the cases selected here. Several studies also take interest in how far SIs can re-shape power relations or lead to greater social inclusion and empowerment (e.g. Moolaert, 2009; Phills et al., 2008, cf. also Ayob et al., 2016). Adding to this aspect, for all selected cases in this study the innovation processes contained events which explicitly invited wider public participation.

Below a short description of each case is provided:

¹ For an overview of existing definitions for SIs, please see (Rösing Agostini et al., 2017).

Table 1

Basic characteristics of the three selected cases. Contrasting features are highlighted in bold.

Name (English): Name (local language): Geographical location:	Habitat bank Habitaattipankki Finland	Forest share Waldaktie Mecklenburg-West-Pomerania, Germany	Love the forest Ålska Skog Gothenburg, Sweden
Governance type: Governance level: Development stage: Year of initiation Targeted FES:	Payments for ecosystem services (PES) National (country) level Baby stage (<10 years, first pilots in planning) 2014 Supporting (forest biodiversity + habitats)	Regional (state) level Adult stage (>10 years, currently paused) 2006 Regulating (carbon sequestration)	Local (city) level Childhood stage (<10 years, 2 campaigns run so far) 2016 Cultural (environmental awareness and education, experiencing and gaining inspiration from forests)
Bio-geographical region: FES provider/s	Boreal Private forest and land owners who implement and manage offsetting sites	Continental Municipalities providing land for reforestation, State forest agency managing the reforestation and maintenance activities of established 'climate forests'	Boreal A science museum which organizes activities for school children to enjoy and experience Swedish forests and to raise their environmental awareness on which FES are provided, to them and to society
FES buyers	Corporate businesses of all economic sectors which destroy/devalue forest habitats	Tourists visiting the region, Locally based corporate businesses, other voluntary buyers	Corporate business in the forestry sector
FES beneficiaries	Offsetting companies, municipalities where pilots are implemented, society at large*	Buyers of the Forest share who want to offset their carbon footprint, society at large*	Swedish youth (school children), society at large*
Websites: (last accessed: 17/06/2021)	https://blogs.helsinki.fi/habitaattipankki	https://www.auf-nach-mv.de/nachhaltig/waldaktie	https://www.universeum.se/nyheter/alska-skog-oppnar-ogon-for-den-svenska-skogen/

* As the co-beneficiaries of public good-type FES.

Habitat bank, Finland (FN): The core idea of the Habitat bank is to introduce a mechanism for ecological compensation at national scale in order to help halt biodiversity loss in Finland's forests. Thereby private sector actors causing ecological damage (e.g. through infrastructure projects or other economic activities) act as FES buyers to offset these damages by investing in restoration and conservation activities of forest habitats conducted by forest owners and managers as the FES providers. The Habitat bank is still in the planning and design stage. Nevertheless, first pilot projects are under way in cooperation with the Lahti municipality in South-Finland, interested in compensating construction activities linked to a large residential project. Therefore, a screening process is in progress for identifying possible offsetting sites.

Forest share, Germany (DE): The core idea of the Forest share is to leverage private funding for planting and maintaining 'climate forests' on public land. Thereby private individuals, mainly visiting tourists to the region, as well as corporate businesses, who voluntarily like to offset their carbon emissions from holiday activities or business operations, act as FES buyers, obtaining the Forest shares. Each share costs 10 Euros and maintains five square meters of 'climate forest'. As the FES provider acts the State forestry agency, which secures the land from local municipalities, organizes the planting events in which FES buyers can participate, and maintains the afforested areas through suitable management measures. The Forest share is a fully grown scheme operational since 2007. So far, 85,000 shares were sold and raised funds allowed for the creation of 18 climate forests in different locations across Mecklenburg-West-Pomerania, covering about 80 hectares. Presently sales are paused, because scouting of new afforestation sites is under way.

Love the forest, Sweden (SE): The core idea of Love the forest is to engage school children of different ages as the FES beneficiaries into different activities, which help in raising their environmental awareness and enjoyment for the multiple FES that forests can provide to them and society at large. Activities include visits to the forest, along with educational activities conducted in a museum, as well as activities to spur creative and unconventional ideas on new types of FES products and how these could be marketed. Funding for these activities is leveraged from the forest industry, acting as the FES buyers, based on their interests to motivate some of the involved children to consider a later

carrier in the forestry sector. Another aim of Love the forest is to contribute to a general paradigm shift within the Swedish society, where forests are still seen mainly as a source for extracting provisioning FES rather than cultural and other non-material FES. So far, two successful iterations of Love the forest have been conducted. Currently, the concept is re-designed for a new campaign addressed at older school children.

Figure 1 shows the location of the three selected cases in Europe.

2.2. Applied methods for data collection and analysis

A qualitative case study approach to gain in-depth knowledge on each case was chosen (Bryman, 2016; Stake, 2005). For data collection and analysis, the Process-Net-Map method was applied (Schiffer, 2007). The method is rooted in social network analysis aimed to investigate social structures through the use of network and graph theory (e.g. Estrada, 1988). It is applied as an interview-based research method for the participatory mapping of key events and the involved actors in a specific development process under investigation. Participation of interviewees is encouraged by asking them to actively engage into the mapping exercise, e.g. by creating event and actor cards which are then positioned along a timeline to visualize how the innovation process unfolded over time. Thereby the method also allows for capturing the different perceptions of the interviewees in terms of which events and actors they find worth mentioning. The importance of analyzing perceptions to better understand complex solutions for environmental governance has also been emphasized in the literature (e.g. Beyerl et al., 2016). The participatory nature of the method and its ability to capture interviewees' perceptions was also the main motivation to choose it for this study. The method has already proven its suitability to study social innovation, and, for instance, was applied to analyze innovation processes for improved animal vaccination in Zambia (Lubungu and Birner, 2018), or food securing innovations among rural farmers in Tanzania (Zampa, 2017). In this study, it was used to analyze the development process of the three selected governance innovations. To do so, the method was specifically adjusted for the purpose of this study and divided into two parts: a retrospective analysis to retrace the historic development process up until now (backward looking analysis), and a



Fig. 1. Location of the three selected cases within Europe.

prospective analysis to speculate about the further future development process (forward looking analysis).

For **data collection** Process-Net-Map interviews were conducted in different locations for each case (Helsinki, Finland; Güstrow, Germany; Gothenburg and Lund, Sweden). Since the ideal interviewee needed to have extensive knowledge on the case, preferably the whole or at least longer stretches of the innovation process, the number of potential interviewees was per se limited. Therefore, selection of interviewees was strategically guided with the objective to find interviewees who were directly involved into the innovation process (purposive sampling, cf. Bryman, 2016). To capture different perceptions, the aim was to include at least two interviewees per case. If possible, covered perceptions included the perspective from one ‘research’ and one ‘practice’ partner involved into the InnoForEST-project. Six interviews with nine interviewees were conducted in total in the period between July 2018 and April 2019. They were either conducted as individual interviews with a single interviewee or as group interviews with two interviewees. Interviews lasted between 78 and 217 minutes. On average, each hour of

recording yielded roughly 30 pages of transcript (Table 2).

Before starting each interview, informed consent was obtained from the interviewee/s in writing, also clarifying that their name and affiliation could be listed in the acknowledgements as a source for the information obtained on a specific case. All interviewees agreed to the audio-recording of the interview which was later fully transcribed for further analysis. Statements from the interviews are used in the result section to back up argumentation. Therefore, statements are anonymized to ensure data privacy, just referring to the case (FN, DE, and SE) and not to individual interviews.

Although interviews were the main sources for data collection, some additional information was collected from existing websites and documents, such as flyers or reports. These sources were also consulted to complement and verify some of the information obtained from the interviews (method triangulation, cf. Bryman, 2016; Heale and Forbes, 2013).

All interviews were conducted in the same fashion, following a semi-structured interview guideline following the steps outlined in Table 3.

Table 2
Conducted interviews per case.

Case	Interviews	Number of interviewees [n]	Number per ‘type’ of interviewee		Timing [month/year]	Duration [hours]	Transcript pages [n]*
			Researcher	Practitioner			
Habitat bank, Finland (FN)	FN-1	2	2	–	01/2019	2:45	100
	FN-2	1	–	1	01/2019	2:13	45
	FN-3	1	1	–	02/2019	1:18	34
Forest share, Germany (DE)	DE-1	2	1	1	07/2018	3:37	96
Love the forest, Sweden (SE)	SE-1	1	–	1	04/2019	1:50	51
	SE-2	2	2	–	04/2019	2:53	100
TOTAL		6		6	3	14:36	426

* Counted as norm pages á 1,500 characters.

Table 3
Steps involved for data collection during the Process-Net-Map interviews.

Steps involved	Performed activity for creating the Process-Net-Map	Information for legend
1. Identify relevant actors	Note down actors' names on actor card (sticky notes) in color 1	Explain color in legend
2. Identify important events	Note down events' names on event cards (sticky notes) in color 2	Explain color in legend
3. Collect further attribute data on actors , e.g. ...	<p>... for indicating when each actor joined the process draw a timeline and place actor cards accordingly along the timeline</p> <p>... for indicating each actor's particular role/s think of a shortcuts and mark them down on each actor card.* Several roles might apply for a single actor.</p> <p>... for indicating actors motivations ask interviewees to freely name the motivations of different actors and select icons which represent the different motivations.* Several motivations might apply for a single actor.</p> <p>... for indicating each actors' level of influence in decision making stack towers on each actor card by using sweets (can be eaten later on!) or small wooden bricks. Bricks can be added or taken away until the interviewee is satisfied with the height of all towers. The higher the tower the more influential is the respective actor. The allowed number of bricks can be free or limited (e.g. maximum of five bricks). Eventually, the final height of each tower is noted down on the actor card using a specific color and bricks are cleared from the sheet.</p> <p>... for indicating each actors' level of benefits, stack again towers on each actor cards. Eventually, the final height of each tower is noted down on the actor card using a new color and bricks are cleared from the Process-Net-Map.</p> <p>... for indicating the actor type (like civil, public, private, hybrid, or similar) think of a shortcut.*</p>	<p>–</p> <p>Explain shortcuts in legend</p> <p>Explain icons in legend</p> <p>Explain color used for influence level in legend, mark down allowed maximum number of bricks (if applicable)</p> <p>Explain color used for benefits in legend, mark down allowed maximum number of bricks (if applicable)</p> <p>Explain shortcut in legend</p>
4. Collect further attribute data on events , e.g. ...	<p>... for indicating the time when an event occurred in the process place event cards accordingly along the timeline</p> <p>... for indicating if an event is a one-time vs. a regular/repeated event think of a symbol or chose different colors.*</p> <p>... for indicating involved actors in each event draw lines between the respective actor and event cards.*</p> <p>... for indicating at which governance level (local, regional, national, international) an event occurred, place event cards at different levels of the Process-Net-Map.*</p>	<p>–</p> <p>Explain symbol or color in legend</p> <p>–</p> <p>–</p>
5. Identify challenges during the process	Draw an icon (e.g. bolt) on those actor/event cards which were linked to challenges in the process.*	Explain icon in legend
6. Identify star moments during the process	Draw an icon (e.g. star) on those actor/event cards which were pushing the process forward/gave momentum to the process.*	Explain icon in legend
7. Ask which criteria best define success and/or failure/set-back	Demarcate an area on the Process-Net-Map and note down criteria there. If Process-Net-Map is already too busy use extra sheet.	–

* Alternatively, this information can be later retrieved from the recordings/transcripts, particularly if the agreed time for the interview is limited and/or the Process-Net-Map is already very busy.

These steps were applied for both the backward and the forward looking analysis. While interviewees were responding to the questions, in parallel, the provided information was visualized in the Process-Net-Maps. The following materials were used: large sheets of paper, sticky notes and pens in different colors, materials to build towers (e.g. wooden bricks, stackable sweets), recording device, camera, extra batteries, interview guideline, and prepared participant consent forms.

During the interviews, jumping back and forth between the steps was an integral part of the interview process, to allow for a natural flow of the conversation. After each interview, a photo of the Process-Net-Map was taken (cf. Figure 2) as a precautionary measure, as some of the sticky notes may shift during transportation.

Eventually, each interview yielded two outputs, both equally important: the Process Net-Map with the visualization of the innovation process with all relevant events and actors (mainly quantitative data, e.g. number and kind of actors involved), and the interview transcripts, holding additional explanatory information for the interpretation (mainly qualitative data, e.g. why certain actors were relevant, etc.).

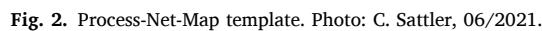
For **data analysis**, first, the paper-versions of the Process-Net-Maps were digitalized into a flow diagram using PowerPoint (Microsoft). To allow for comparisons, the same template was used for all cases,

although the paper-versions of the Process-Net-Maps slightly differed, e.g. in regard to used symbols to represent actors' motivations. In addition, a record of all identified actors and events was entered into an Excel template (Microsoft) together with their attribute data (see Annex 1–4). Second, all interview recordings were transcribed verbatim with the software f4 (Audiotranskription). The transcripts were then thematically coded looking to extract more detailed information on actors and events and their respective attributes. This was done based on qualitative content analysis, employing deductive and inductive coding (cf. Mayring, 2000). For deductive coding pre-defined themes were used as listed in Table 3. For inductive coding new themes were generated from the study of the material, particularly for the analysis of actors' roles. Coding was done manually using different color codes for each theme. In parallel possible quotes were retrieved.

3. Results

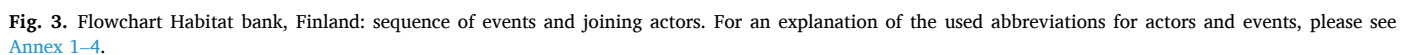
3.1. Innovation processes of FES governance innovations

In this section, RQ1 is addressed: When and how did the innovation process in each case emerge and develop over time, with a particular



Backward looking analysis: The idea for the Habitat bank was

triggered by the very successful METSO program (FN1, Forest biodiversity program for Southern Finland), initiated in 2008, which provided public funds to forest owners for conservation measures to prevent further biodiversity decline in Finnish forests. Besides this program and the possibility to establish private protection areas (FN2), there was no system in place yet at the national level which allowed for tapping into private money for forest conservation and at the same time enabling



private companies to offset their environmentally damaging activities. So in 2014, the innovator (FNI) suggested such a system in a letter addressed to a popular newspaper (FN3). He also discussed the idea with several colleagues (FN4) at the Finnish Environment Institute (FEI), who joined in and together they spread the idea further. Then one interested partner from the University of Helsinki (UHE) suggested to apply for the 'Helsinki challenge' with the idea (FN5), a science completion held for all national universities, which also offers some seed money. During the preparation of their video pitch, they conducted interviews with key actors from industry, policy and administration (INT). Further supporters joined in (UJY, MNT). Their participation was successful (star) and received a lot of attention from press and media (FN6, P + M). FEI also received an invitation to join for the writing of an EU-proposal (FN7, EUP), for which the Finnish Forestry Center (FFC) joined as another partner. To invite input from a wider range of societal actors (TFS) a 'giant workshop' (FN8) was held with more than 100 participants (e.g. FCO, FOW, NGO). This was followed-up with smaller workshops (FN9) in which discussions got quite difficult (bolt): Although the events confirmed a wide interest among forest owners as potential FES providers and companies as potential FES buyers, discussions started that an intermediary would be needed to handle the contracting between parties, and that it would be difficult to ensure that only 'like for like' would be compensated for, addressing the suspicion that the idea would give companies 'the right to destroy'. *"They were really sure that we would trade apples for oranges"* (FN-interviewee). This was also based on the fear of conservationists that companies were given a 'free pass' to develop land without taking into account its inherent value for conservation. To this end, also the decision was made to not include protection areas for compensation efforts. Explorative talks with ministries (MEN, MAF) and a minister round table (FN10) followed, also addressing legal issues which required input from a law expert (ULP). Shaping all these ideas further was done in smaller and very productive ad-hoc meetings (FN12, star). In 2016, a feasibility study (FN11) for the introduction of the Habitat bank at national level was envisaged and a grant application to finance the study was prepared. Since the application was unsuccessful (bolt), the feasibility study was conducted without additional funds, exploring a voluntary and a regulative scenario for the introduction. This helped clarify that the idea would not require new regulations per se, when opting for the voluntary scenario. To make it available to everyone, the study was published (FN13), as were several other studies analyzing valuation approaches for the matching of sites. Collected knowledge was presented to different stakeholder groups in a row of seminars and workshops (FN14), some of them with public panel discussions attracting press and media attention. In 2017, two grant proposals, for a national project on ecological compensation (FN15) and for the EU-project (FN16) were successful. In 2017/2018, a core team of about 40 people had formed as the 'habitat cluster' with all contacts available in an e-mail list to support interactions (FN17). In 2018, a website for the Habitat bank was launched (FN18). Also in 2018, the international ECCB (European Congress of Conservation Biology) conference was held, which dedicated one whole day on ecological compensation (FN19, star). Further stakeholder formats took place (e.g. seminars, workshops, Delphi study, FN20). In the national project, first pilots where implemented and excursions with stakeholders organized (FN21). To address land owners specifically, a leaflet in Finnish was elaborated (FN22). The summarized results of the workshops held in 2016 were published in a scientific paper (FN23). In the EU-project, scenario workshops (FN24) were held, focusing on the voluntary approach, but not all invited stakeholders participated (bolt).

Forward looking analysis: When the interviews were conducted (01–02/2019), preparations were under way for further workshops (FN24), with a focus on pilot development. In parallel, interviews and personal meetings with different stakeholder groups to explore their interest in becoming involved in the pilot planning (FN25), and first screenings of possible private sites for the implementation of the pilots were planned (FN26, CIT, RAD). Another planned activity was to look

for a suitable intermediary (IME), trusted by all parties, which can be a private, public or civil actor, as well as a certifier (CER).

3.1.2. Forest share, Germany

Figure 4 presents the flowchart for the Forest share, Germany, followed by the narrative.

Backward looking analysis: The idea (DE1) for the Forest share was conceived in 2006, against the backdrop that the State ministry of the environment in Mecklenburg-West-Pomerania, in which the innovator (DE1) led the Department for sustainable development, was restructured after the latest state parliament election. As a consequence the department was halved in staff and merged with the Forestry division within the Ministry of agriculture, environment and consumer protection (MAE). The minister leading this ministry wanted to be perceived as pro-environmental, and since the department was now combined with Forestry, is seemed logical to develop an initiative linked to forestry. Also, around the same time, the STERN-report (DE2, P + M) was published, triggering an increased global awareness for climate change issues further preparing the ground for the idea (star). First internal talks followed, also resulting in a 3D-toolkit called the 'climate cube' (DE4) presenting climate facts and figures useful for pitching the idea to others. Allies from the tourism sector (TMV) as an 'economic giant' in the region (the state has roughly 30 million tourists annually with only 1.6 million inhabitants) and the State forestry agency (SFO) joined the process, creating the core group of the innovation team, internally termed the 'triumvirate' ('Dreigestirn' in German). Mid of 2007, a first non-public tree planting action (DE6) was implemented as a pilot realizing first sales to tourists, also involving local gastronomy businesses (GAS) and the regional tourism associations (RTA). Sales were administered by an NGO (NUE, DE5). In 2008, the Forest share was represented with an own booth at the international tourism fair (DE7, ITB) and received substantial public attention from the press and media (star). The Deutsche Bahn (national German train service) then included the Forest share into an AMEROPA-project (DE8, AME), advertising a 7-day-holiday on the island Rügen in their magazine 'Mobil' (550,000 copies) which was very successful and led to the first planting action (DE9), which was also open to the general public (TGP) and where private buyers (PBY) of the Forest share could voluntarily engage to plant their own trees, creating the first 'climate forest'. 2008 was also a busy year with first awards (DE10, DE11) received from the German innovation network 'Land of ideas' (LOI) and the acting committee (CUN) for the UN Decade projects for 'education for sustainable development' (awarded again in 2010, DE17). The Forest share was also nominated for the German tourism prize (DE12), but was out-competed eventually. This was owed to the fact that the Jury (JGT) got polarized, with members either being fully in favor or in opposition to the idea. The latter raised for instance the concern that it supported the notion that environmentally damaging activities could simply be 'paid-off' rather than prevented in the first place. Despite these concerns, the Forest share continued its success and a highlight in 2009 was the reception of the acting German federal president (PRE, DE13), an advocate and buyer of the Forest share himself. Public plantings became regular events organized in different locations in spring and fall each year (DE14, DE16, DE19). DE14 took place in a protection area (PRA) and was linked to a discussion if additionality could be realized (challenge) due to the designation status. This led to the decision to place further public plantings outside protection areas. Another milestone was met, when a local energy company (LCO) was gained as a supporter, which invested 10 Euro for each new client for some time and became a regular buyer afterwards, with their own employees involved in planting activities as a corporate volunteering initiative. In 2017, the Forest share celebrated its 10th anniversary (DE18) with a festivity with about 200 invited guests and another public planting event (DE19) and was again acknowledged as an UN-decade project, this time for biodiversity (DE20). In 2018, Mecklenburg-West-Pomerania became a partner 'country' of the international tourism fair (DE21) with the task to make the fair climate

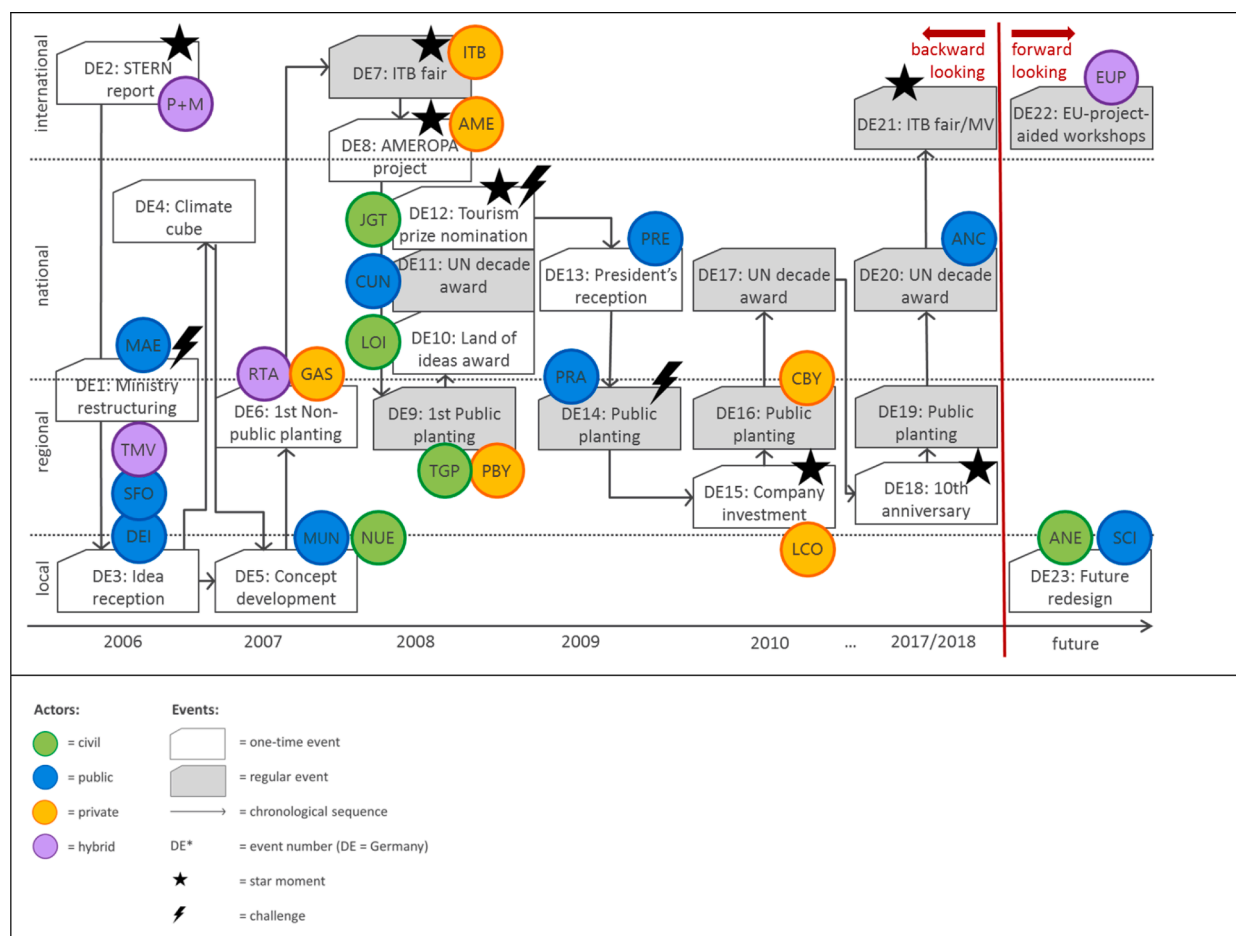


Fig. 4. Flowchart Forest share, Germany: sequence of events and joining actors. For an explanation of the used abbreviations for actors and events, please see Annex 1–4.

neutral. This was extraordinary (star), because so far only countries were invited as partners.

Forward looking analysis: When the interviews were conducted (07/2018), for the future redesign of the Forest share two scenarios were envisioned: a) a Forest share 2.0 to bundle carbon sequestration with additional FES such as water quality, biodiversity protection, and environmental education, or b) a creation of a whole portfolio of eco-shares, including other existing shares (MoorFutures, <https://www.moorfutures.de>, and Orchard enjoyment share, <https://www.streuobstgenusschein-mv.de>) to allow buyers to mix and buy them in only one transaction. For a), a challenge was to quantify the additional FES which would require help from additional science actors (SCI). For b), to handle transactions in only one online system, a new actor (ANE) was designated. In any case, the Forest shares wanted to stay true to its standards: realize sells only through private money, to ensure additionality, and use only public land for re-forestation to safeguard long-term maintenance. Further details for the redesign (DE23) were planned to be specified in workshops (DE22), conducted with the support of the EU-project (EUP).

3.1.3. Love the Forest, Sweden

Figure 5 presents the flowchart for Love the Forest, Sweden, followed by the narrative.

Backward looking analysis: The point of departure for the Swedish innovation was the fact that the science museum Universeum (SMU), based in Gothenburg, affiliated to the two local universities (UNI), wanted to redesign their rain forest exhibition and started a fund raising campaign for this purpose (SE1). They called upon an existing network

of partners from the Swedish forest industry (PFO), but got the feedback that they were more interested to give money for activities related to Swedish forests. “The whole innovation started in 2016 ... because we wanted to redesign our rain forest [exhibition]. And during that process we went out to fund raise since Universeum is dependent on external money for everything we do, so every project has to be financed by partners or stakeholders. ... We contacted the forest industry. And then the forest industry said no, we don’t want to participate in a rain forest exhibit. Cause we are more concerned about the Swedish forest” (SE-interviewee). Against this backdrop, the idea for Love the forest was born. The inventor (SE1) was a new employee of the museum, who was also tasked with the fund raising campaign and then thought up the first concept (SE2). The idea was to actively involve school children as the younger generation into activities for experiencing the forest and to raise their awareness about the multiple values that forests hold. This idea was presented to the partners from the forestry sector in a first workshop (SE3) with altogether six partners eventually committing to act as funders (FUN) dedicating a budget of 200.000 Swedish Krona. These funders were also motivated by the prospect that some of the school children might get inspired through the activities to consider a later carrier in the forestry sector. At the workshop, the discussion on which topics to include for the first run of Love the forest was led very emotionally, with workshop participants falling into two camps: While the first wanted to primarily focus on the productive use of forests, the other wanted to highlight the importance of restricting productive use to support forest conservation. This led one previously committed partner to drop-out (DRO, bolt). At this first workshop also the members of a steering committee (SCM) were selected, aiming to balance the influence between the funding partners

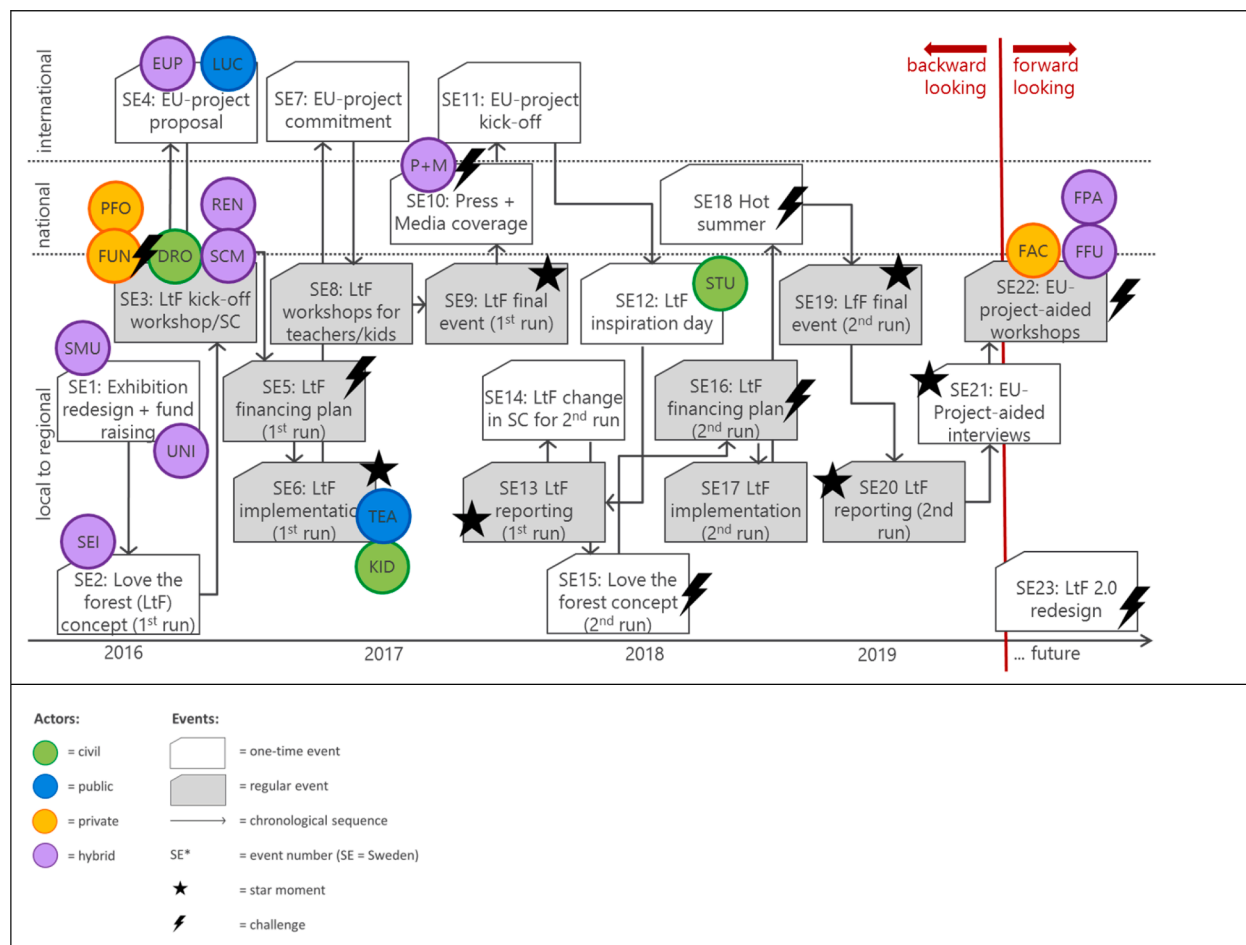


Fig. 5. Flowchart Love the forest, Sweden: sequence of events and joining (or leaving) actors. For an explanation of the used abbreviations for actors and events, please see Annex 1–4.

from the forestry industry with additional science partners from the two local universities (UNI). This was also deemed critical to ensure that future discussions were led more ‘fact-based’. Around that time, a member of the steering committee, who was also a member in a national research network (REN) suggested to make Love the forest a case study in a planned EU-project and asked the museum to join the proposal development (SE4). In a next step, funding details for Love the forest were negotiated (SE5) with the funders (FUN), which took quite long before an agreement could be reached. The partners committed for two years as a start and decided that payment was divided into two annual installments, although the museum had hoped for a more long-term commitment (bolt). Early 2017, the first run of Love the forest started (SE6). It was designed as a contest addressed to younger school children (5th and 6th grade), where the winner received 10,000 Swedish Krona. In their competition proposals the school classes had to suggest activities to promote experiencing the forest for a certain group (e.g. newly arrived swedes, families, etc.), and present an idea for an innovative product gained from forest resources. The competition was a huge success (star) with all offered places fully booked. During 2017 also the EU-project proposal was approved with SMU as a partner joining LUC as the already committed science partner to build the Swedish project team (SE7). Some team members of the science partner had already participated in some of the Love the forest workshops (e.g. SE8) as well as the final event (SE9) taking place at the museum. Key participants of the workshops and the final event were the school kids (KID), their teachers (TEA), as well as all funding partners. At the final event (star), the kids could engage in fun activities suggested by the forestry partners and finally presented their ideas to a Jury made-up by the SCM who voted for

the winner. Also, a promotional movie was done. During the final event also the EU-project was introduced and some of the industry partners, members of the steering committee, teachers and school kids were recruited for follow-up workshops, interviews, and a survey. The final event received some coverage by the media (SE10, P + M), but the museum had hoped for more attention (bolt). The EU-project kick-off meeting then took place at the end of 2017 (SE11). To shape ideas for the second run of Love the forest in 2018 an inspiration day (SE12) was organized, also reflecting on the first run. Results were documented in an evaluation report with a positive evaluation (SE13, star). As a consequence of the evaluation also the SCM was changed for the second run, replacing several CEOs by PR and marketing staff, as the former were ‘too busy’ to fully engage (SE14). “They didn’t have the time and they didn’t even have the awareness of how to work with school kids. So that was really hard” (SE-interviewee). As an outcome of the inspiration day, the concept for the second run (SE15) was slightly changed and addressed to older school kids (7th and 8th grade), asking them to elaborate concepts for communicating ‘sustainability’. But no class signs up, because the timing did not fit within their tight curriculum (bolt). Thus, the decision was made to go back to the old concept of the first run. When planning the finances (SE16), it became clear that for the next run the pressure was higher to not only break even, but actually make profit for the museum (bolt). “Cause we - and that’s like a spoken rule now - that we don’t commit to projects that won’t make profit” (SE-interviewee). However, the second run of Love the forest (SE17) was again a success with better engagement of the SCM. An additional challenge was a very hot summer in 2018 (SE18), which reduced visitor numbers so that the museum had to let some staff go. Nevertheless, the final event 2018 (SE19) was again

a success (star), also documented in the evaluation (SE20), drawing from the feedback collected through surveys with teachers and school children. In preparation of the next run, interviews with partners from the forestry sector (SE21), assisted by students (STU), were conducted yielding informative results (star) about their interests on how to extend Love the forest (Fig. 5).

Forward looking analysis: At the time the interviews were conducted (04/2019), already two EU-project-aided workshops (as part of a longer workshop series, SE22) had been held, moderated by an external facilitator (FAC), to brainstorm ideas for the concept of a redesigned version called Love the forest 2.0. At the workshops, three different scenarios were envisioned: create forest experiences for new swedes as ‘wild kids’, realize a ‘certified outdoor guide’ for disabled persons or awareness raising for ‘climate change’ issues. The workshop series also aimed to engage new actors from the forest industry and other sectors as potential future funders (FFU), including the one actor who had dropped out before (DRO). But the participation so far had not been as high as hoped for (bolt). For the redesign (SE23), addressed again to older school kids as future participants (FPA), the funding is still unclear (bolt).

3.2. Actors' roles in which types of action situation they interact with each other

In this section, RQ2 is addressed: What can be learned from a comparison of all three cases in regard to the different roles that actors assume during the innovation process?

As depicted in the flowcharts (Figure 3, 4 and 5), all analyzed cases involved a large variety of different actors from the civil, public, and private social sphere engaged from different governance levels. For these actors, six main roles could be identified through the analysis of the transcripts, which occur across all cases: innovator, supplier, implementer, influencer, intermediary, and antagonist (Table 4).

The role of an **innovator** applies to the actors who conceived the original idea (e.g. FNI, DEI, SEI), and then look for other actors to join them for the innovation. “And he wanted to talk me into an idea of ecological compensation and that we could start advancing it somehow” (FN-interviewee). Also, actors who bring in new impulses during the innovation process by thinking outside the box are assigned this role (e.g. KID for SE): “So the students they came up with the weirdest ideas what they should make [for the contest]. Like cigarettes made from trees. So it would be expensive and taste bad so people would stop smoking” (SE-interviewee).

The **supplier** role is assigned to actors who supply either financial or other material resources. Actors with this role get the means to provide what is necessary to move forward with the innovation. Examples are FEI for the FN-case in regard to securing research grants. Another example is MUN in DE as a supplier of the land used for reforestation activities.

Actors with the **implementer** role implement planned activities. They perform the actual tasks on-the-ground, such as implementing pilots (e.g. FFC for FN), planting trees (e.g. SFO for DE), or taking the school children out of the classroom into the forest (e.g. SMU for SE). “And for the students they love being outdoors. They love getting out of the classrooms. ... and they love Universeum [SMU], so it's just a win-win-win”, SE-interviewee.

The role of an **influencer** is taken up by actors who are able to exert influence on other actors and change their perceptions. They can sway other people's opinions in favor of the innovation, mobilizing them to get engaged themselves or advertise it to others, possibly accelerating the development process (e.g. PRE for DE). “Alone, because he is the federal president and committed publicly to it [the Forest share], and because we could use the photos for promotion” (DE-interviewee).

Actors in the role of an **intermediary** can connect other actors. They can build and maintain networks, mediate between parties and negotiate agreements. By linking actors better, they can speed up information flows and knowledge. One example is TMV in DE, who links the

Table 4

Typical actors' roles in the innovation process (examples).

Actors' roles	Habitat bank, Finland (FN)	Forest share, Germany (DE)	Love the forest, Sweden (SE)
Innovators (generate ideas)	FNI, FEI, UHE, UJY, FFC, EUP	DEI, SFO, TMV, ANE	SEI, SMU, SCM, KID
Suppliers (get resources)	INT, FEI, MNT, ULP, MEN, MAF, FCO, EUP, CER	TMV, MAE, MUN, PBV, CBY	PFO, FUN, UNI, STU, EUP, FFU
Implementers (implement activities)	FNI, FEI, FFC, UHE, EUP, FOW, CIT	SFO, TMV, ANE, NUE	SEI, SMU, KID, LUC
Influencers (change perceptions)	FNI, FEI, INT, UHE, UJY, EUP, P + M	DEI, PRE, LOI, CUN, AME	PFU, FUN, SCM,
Intermediaries (connect others)	FNI, FEI, FFC, EUP, IME, RAD	TMV, EUP, ANE	SEI, SMU, TEA, REN, EUP
Antagonists (oppose ideas)	NGO	P + M, PRA, JGT (partly)	DRO, P + M

initiative to the visiting tourists of the region. Another is FEI in FN: “Yes. I am kind of like the supporting person ... for our practice partner, more or less. And this probably comes from my background ... So I know people from the forestry sector because of that. And I've been involved with these practitioners before” (FN-interviewee).

Finally, **antagonists** speak against the idea and criticize it publicly. In this role, they can slow down the innovation process and hinder progress. As one example, P + M was mentioned several times as an actor in the antagonist role, e.g. for Germany when criticizing that emissions should rather be prevented than mitigated. “The opinion that monetarization of ecosystem services is devil's work is not one of single individuals, which we could address. Rather, it's the predominant opinion of ... [names], which don't get tired to publish on it” (DE-interviewee). Nevertheless, P + M can very often also take on the role of an influencer and act in a positive role.

In essence, the different roles identified mirror the skills needed to push off the innovation process and keep it going over time. The innovator is crucial to spark the initial idea, but he/she needs to have the support from actors who take on the other roles if the innovation should survive in the long-run. Even the antagonists might have a crucial role by pointing out weaknesses that need to be addressed or by wielding the coalition of involved actors closer together to resist such opposition.

As shown in Annex 1, for all cases, single actors can assume more than one role. Thereby, actors draw from multiple motivations for their engagement (see Annex 2). High influence levels can result from all actors' roles and there is no observable pattern (see Annex 1).

3.3. Action situations in the innovation process

In this section, RQ3 is addressed: What can be learned from a comparison of all three cases in regard to how different events represent typical action situations in which actors interact throughout the innovation process?

As shown in the flowcharts (Figure 3, 4 and 5), the events reported by interviewees in all three cases cover all governance levels, from the local to the international, although the innovations themselves aimed at different levels. Events which occur across all cases could be grouped into typical action situations, which included: trigger situation, idea conception, core team build-up, piloting, stakeholder interaction, acknowledgement, press and media coverage, and science partnership (Table 5).

Trigger situations often mark the beginning and characterize a situation that brings about the initial idea for the innovation. For instance, in DE this was the re-structuring of one ministry (DE1), which resulted in dismissals and the merger of a trimmed-down department with another ministry, where the new employees had to redefine their tasks: *“We acted from necessity, so-to-say. Necessity is the mother of invention”* (DE-interviewee).

Idea conception, provoked by the trigger situation, then is about shaping the idea and working on a first concept that can be shared with others (e.g. FN4, DE3, DE5, and SE2). *“So we had a big workshop and I said, ok if we gonna start a Swedish forest project what do you want to do? And they said ... we want to reach out to the younger generations. ... To make them aware of biodiversity ... and climate control and for all that the Swedish forests are for. So that was like, ok we got to do a project for the schools. So during 2016 the entire year we had more workshops and we developed Love the forest 1.0”* (SE-Interviewee).

In **core team build-up** the innovator looks for ‘partners in crime’ as allies who will join him/her in the effort to push the idea forward. The interaction between the innovators and the environment they are operating in is crucial as new ideas have to obtain support. Often the won allies provide access to critical resources or have particular skills. Membership to the ‘core team’ can be fixed (e.g. ‘triumvirate’ for DE) or open. The latter applied in the FN-case, with a more fluid membership to a bigger team: *“... so then it was already a bigger very informal kind of e-mailing list and Linked-in network ... So that [is] really where it [the ecological compensation in Finland] started, like people began to look at it from very different angles. There is one that looks at psychological things*

related to ... there is one who looks at small scale compensations like a normal consumer. In this sense, there is a lot of things going on there that helped to bring out the topic to a larger group of stakeholders as well” (FN-interviewee).

Piloting relates to ‘proof-of-concept’-situations where involved actors work on the first practical implementation of the idea. In how far these events are already opened up to the participation of a broader audience can differ. For instance, in DE the first planting action was kept small and ‘non-public’: *“Yes, in the first year we worked on the concept ... in November 2007 then we organized our first planting action, in a small forest close to Neustrelitz. That was, or is, not a public climate forest, it’s just a small area there, which was used to kick things off”* (DE-interviewee).

Stakeholder interaction includes events which aim to communicate the idea to as many potential users and beneficiaries as possible, as well as actively inviting their input for the further design and implementation. In DE the planting actions became a tool to reach out to stakeholders: *“They ... [responded] always positive, but when 25 people participate, the echo of course is different than when there are 1,000”* (DE-interviewee). Another example from FN is the ‘giant’ workshop with more than 100 participants meant to collect input for the idea from a wider audience: *“Then 2016 we wanted to mobilize the Finnish society ... So ... we organized one giant workshop that we thought would be smaller but then it had more than 100 people”* (FN-Interviewee). And in SE, about 450 school children and 35 teachers participated in the final event (SE19) to present their project to each other. *“And then all the school kids came to this final event. And we were there and the partners were there, and the kids and the teachers. So it was a massive event”* (SE-interviewee).

Table 5

Typical action situations in the innovation process (examples).

Action situations	Habitat bank, Finland (FN)	Forest share, Germany (DE)	Love the forest, Sweden (SE)
Trigger situation (triggering the idea)	FN1: Limited public funds available for METSO-program inspired idea to think about a national system based on private money raised from companies who like to off-set environmentally damaging activities	DE1: Restructuring of ministry DE2: STERN-report raising the public’s awareness for climate change issues at the international level	SE1: Shortage of funds to redesign existing exhibition
Idea conception (shaping of the idea)	FN3: Letter to editor FN4: Lunch at SYKE	DE3 + DE5: Idea reception and concept development	SE2: Idea and first concept development
Core team build-up (finding allies to push the idea forward)	FN17: E-Mail list ‘habitat cluster’	DE3: The ‘triumvirate’-core team already involved into the shaping of the idea	SE3: Kick-off workshop where the ‘steering committee’ is built as the entity for decision making
Piloting (experimenting to implement the idea)	FN26: Screening of suitable site for pilot implementation	DE6: 1st non-public planting as a ‘test-run’	SE6: Implementation of the 2st run of the concept
Stakeholder interaction (getting the idea across to potential users/beneficiaries)	FN8: Giant workshop FN9: Follow-up workshops FN25: Interviews with interested partners for piloting	DE7: Own booth at the international tourism fair (ITB) to present the idea to the targeted user group DE9: 1st public planting where buyers of the share can plant ‘their’ own trees	SE8: Workshops for teachers and kids SE9: Final event for the first run with competition S12: Inspiration day to invite ideas for the 2nd run
Acknowledgement (innovativeness of the idea is confirmed by external awards, prizes, grants, or similar)	FN5: Helsinki challenge FN15: Grant for national project	DE11, DE11, DE17, DE20: Nomination for the tourism prize, Several UN decade awards DE13: President’s reception	SE7: Idea is invited to become a case study in an international research project
Press + Media coverage (introducing the idea to the general public)	FN6: Media attention through Helsinki challenge	DE9, DE14, DE16, DE19: All public planting events covered in the media	SE10: Media attention through final event of 1st run
Science partnership (partnering up with researchers for the idea)	FN15: Involvement in national project FN16: Involvement in EU-project	DE23: Involvement in EU-project	SE3: Partners from science become members in the steering committee SE4, SE7, SE11, SE22: Involvement in EU-project

Acknowledgement represents events where the innovativeness of the idea is recognized by external actors through awards, prizes, or grants. Examples include the prize won at the Helsinki challenge for FN, or, for DE, the UN decade awards and the ITB selection as a partner ‘country’: “Because Mecklenburg-West-Pomerania became a partner country of the ITB. This is somehow special, because this was a first that a federal state became partner. The ITB usually selected national states ...” (DE-Interviewee).

Press + Media coverage is about sparking interests from the press and media (e.g. newspapers, magazines, radio, television, social media) as multipliers to report on the idea and thus help to introduce it to the general public. Here the ITB can serve again as an example for DE: “... such a huge success, especially also in view of public perception, because all bigger TV stations, many print media broadcasted their report from our stand. I really did not expect this” (DE-interviewee). Also the Helsinki challenge yielded a lot of attention from the media: “Yes we got a lot of press, but it was part ... that the Helsinki challenge did that. They were the ones that got the media to interview us and we had photo shoots and this and that” (FN-interviewee). However, ambivalent experiences were reported too by the interviewee (see section 3.2, antagonist role).

Science partnership encompasses efforts to team up with partners from Academia. For SE, for instance, to create a steering committee (SE3), it was important to win over partners from the forestry industry to finance the idea, but also to have science partners on board, who contributed information and knowledge. “... I said I have this steering committee and I need someone to help me with the scientific side of it” (SE-interviewee). For FN, science partners were crucial right from the start, for instance to prepare the bid for the Helsinki challenge (FN5).

When comparing all identified action situations, they on the one hand differ in the number of involved actors and on the other hand in the type of actors involved. While some action situations, like trigger situation, idea conception, and core team build-up involve only one actor, respectively, a rather small circle of actors, the number increases substantially for other action situations, such as stakeholder interaction and

press + media coverage. The action situations piloting, press + media coverage, and science partnerships are then dependent on the ability of the smaller core team to win over or spur the interest of very specific partners, either from practice, the media sector, or science. If the number of involved actors cannot be raised beyond the initial small circle of involved actors, it becomes very likely that the innovation will not gain enough momentum to sustain in the long run.

3.4. Criteria for success and failure of the innovation process

In this section, RQ4 is addressed: Which criteria are used to define success and failure of the innovation processes and to what extent are there commonalities between the three cases?

The criteria for success and failure named by the interviewees are listed in Table 6.

Looking at the different success criteria listed in Table 6, all three cases related to criteria that focus on attitudinal change or **environmental awareness raising** (e.g. no. 1, 12, and 24), also highlighted by statements from the interviews: “I mean there are 500 kids participating every year, and that all of them are looking at the forest in a new way. It’s just really beautiful. So to raise the awareness, that’s the success criteria” (SE-interviewee). Another commonality is **implementation successes** that mark progress of the innovation process with different either directly quantifiable (e.g. number of pilots implemented, amount of sales, afforested areas, money raised, etc., no. 2, 3, 6, 8, 13, 21, 28, 34), or qualitative measures suggested (e.g. going beyond pilots, new business options for some actors realized, having satisfied participants, fit to user needs, permanence, etc., no. 4, 9, 15, 17, 19, 20, 30, 31). “Pilots are easy. Hard is to keep going” (DE-interviewee). This links to criteria which highlight that **ecological achievements** are realized and that ‘nature wins’ (e.g. no. 7, 18, 19, 27). This connects to criteria which imply that ecological achievements can be properly measured and evaluated (e.g. no. 11, 23, and 25). “We do realize, collateral benefits’ attached to the Forest share: ... water quality, ground water proliferation, habitat protection

Table 6
Named criteria* for success and failure of the innovation process by interviewees.

Habitat bank, Finland (FN)	Forest share, Germany (DE)	Love the forest, Sweden (SE)
Criteria for success:		
1. Ongoing debate on ecosystem services, change in peoples attitude toward compensation	12. Increased public awareness on climate issues	24. Increased environmental awareness about the role of Swedish forests
2. Functioning compensation/offsetting system established	13. Measureable achievements for the project (number of shares sold, ha of climate forest planted, participants planting actions)	25. Re-(e)valuation of forests
3. 2-3 pilots implemented + contracts	14. Trusted network of partners	26. Agenda beyond industry
4. More than pilots/test sites	15. Endurance/Permanence	27. Increasing forest visibility
5. Intermediary found who is trusted, transparent, accepted by all parties	16. Continued availability of resources, e.g. land, data, money	28. Raised money available for reinvestment in Swedish forest exhibition
6. Process spread around the whole country, permanence, stable compensation system	17. Self-supporting (no extra finance, marketing necessary)	29. Diversity of partners involved
7. Nature wins!	18. Realization of co-benefits in terms of other FES	30. Both pupils + their teachers and Universeum are satisfied with the initiative
8. There is a market/growing voluntary demand for the Habitat bank	19. ‘Regional fit’, possibility of buyers to ‘self-experience’	31. High interest of schools
9. New business options to forest owners for making money from forest conservation	20. Spin-off/foundation of own company	32. Older school kids included in future runs of the initiative
10. Being proactive, be prepared for policy change which makes offsetting mandatory	21. Further enlargement of the portfolio of shares	33. Commitment of partners
11. Clear how measurement is done to ensure that destroyed and off-set-area match each other	22. Institutional support (e.g. by ministry)	34. Number of hours invested into project
	23. Metrics for FES quantification available	
Criteria for failure		
35. Getting stuck/no further development in the process	39. No securement of additional land, no further ‘growth’	46. No change in awareness reached/no change in behavior
36. Someone intervenes and stops the process and kills all the motivation of involved actors, a powerful actor like the ministry	40. Stagnation of sales	47. Continued dominating production perspective, heavy influence of industry
37. Lack of interest of stakeholders	41. Idea theft/copying of the idea without permission	48. partners not satisfied with partnership
38. No pilots implemented	42. Restriction on transferability, (legal) frame conditions matter	49. no/not enough profit through the initiative
	43. Used for ‘green-washing’, corporate clients ‘hijack’ the idea	
	44. No additionality achieved	
	45. Not enough personal leeway to continue (only job description)	

* To allow for referring to the criteria in the text, criteria are numbered. The numbering does not imply any ranking.

for important species” (DE-interviewee). Another group of criteria addresses the **‘quality’ of the actor network** involved into the innovation process (e.g. finding new actors crucial for the innovation to continue, actors trust each other, targeted users included, diversity of actors realized, etc., no. 5, 14, 29, 32, 33). *“Complete success - we would have like a functioning system with this intermediary that works transparently and reliably. That everybody can trust, that has a good reputation”* (FN-interviewee). This closely links to criteria related to the **frame conditions** in which the actor network has to operate (e.g. preparedness for policy change, have institutional support from governmental actors, continued availability of needed resources, or ability to make sure more powerful actors do not dominate the agenda, no. 10, 16, 22, and 26). *“And so most of them [companies from the forestry sector] saw us as a green washing thing that they could just put some money in it and then kind of observe or just wanting the reporting”* (SE-interviewee).

Looking at the criteria for failure, these can largely be related to the above mentioned categories but indicating the opposite. For instance, no change in environmental awareness (no. 45), process is stopped or stagnates and no further implementation successes are realized (34, 37, 38, 39, 48), no ecological achievements are made (no. 43), the partnership between actors breaks apart (35, 36, 44, 47), or unfavorable frame conditions hinder continuation (e.g. 41, 42, 46). A new aspect is addressed by no. 40. It relates to unauthorized copying of the DE-idea which is reflected in this statement: *“In principle you can’t protect anything except the brand. But this protection can be circumvented relatively easily. You just have to change one tiny thing and then it becomes a new brand. And then you would have to take it up in court”* (DE-interviewee). Importantly, copying is not seen as problematic per se, but how it is done: *„It’s desirable that the idea finds many imitators ... Everyone should develop the idea further ... But what’s a no-go is to copy the brand and change crucial elements which we see as essential quality standards”* (DE-interviewee).

When comparing across cases, it becomes apparent that similar criteria were named for each case, falling into the different grouping named above.

4. Discussion

4.1. Discussion of results

In the following sections, the results presented in Section 3 are discussed in light of other literature studies.

4.1.1. Actors’ roles

The focus on the analysis of different actors’ roles resonates quite well with some recent literature studies. For example Hauck et al. (2020) analyzed actors’ roles in the context of sustainability initiatives in five European countries. To do so, they also employed the Net-Map method, although applied in an adjusted variant. They identified also six actor roles, namely catalysts, opponents, intermediaries, frontrunners, drivers, and visionaries. From their definitions (cf. Hauck et al., 2020:9), some of these roles translate quite well into the roles derived for this study. Besides the most obvious, intermediaries (intermediaries) and opponents (antagonists), visionaries might be equated to innovators, frontrunners to implementers, and drivers to suppliers. However, for drivers and also catalysts a translation it is less straight forward, since their described characteristics mix attributes of the influencer, supplier, and implementer roles, as described by interviewees of this study. Then de Haan and Rotmans (2018:279) looked into actors’ roles to bring about transformative change, and name four roles: frontrunners, supporters, connectors, and topplers, which resemble the innovator,

suppliers, intermediary, and antagonist roles in this study. In further studies (e.g. Geels, 2011; Sattler et al., 2016) more general categories were used. Geels (2011:27,30-31), for instance, differs between niche and regime actors, where the first push for the development of innovations and the latter tend to resist against change, which can be related to the innovator vs. the antagonist roles. And Sattler et al. (2016) differ between active vs. passive actors, which best resonate with the difference between implementers vs. suppliers in this study. Altogether, more research on actors’ roles in the field of transitions studies is called for by different authors (e.g. Fischer and Newig, 2016).

4.1.2. Action situations

The concept of action situations is well established in the literature (e.g. McGinnis, 2011), linking back to Elinor Ostrom’s Institutional analysis and development framework (Ostrom, 2005). In recent studies with an actor-centered focus in social-ecological systems research, it has been used by Kimmich and Tomas (2019) to investigate action situations in the adoption process of energy-efficient irrigation technology in India, as one example. Similar to this study, they depicted action situations as linked events, also indicating the involved actors, creating ‘action situation networks’ (Kimmich and Tomas, 2019: section 2.1). However, the authors use it for thematic structuring and not to highlight the dynamic of the process. They also analyzed which action situations constitute necessary preconditions for the adoption of the technology, like social learning. Schlüter et al. (2019) then use action situations to dissect emergent phenomena in social-ecological-systems, for instance, the regime shift in the management of a lake in Sweden leading to its successful restoration. Therefore they differentiate between action situations within the social system (e.g. information sharing, trading), within the ecological system (e.g. species-habitat-interactions) and between the social and ecological system (e.g. harvesting, monitoring), which they term ‘configurations of linked action situations’. Taking up on their approach, also in this study some of the events in the innovation process could be framed as action situations occurring only within the social system vs. those occurring between the social and the ecological system. For instance the planting actions in the DE-case would be an example, as here social actors directly interact with the ecological system. But for defining action situations within the ecological system for the cases analyzed here, additional data would be needed.

4.1.3. Criteria for success and failure

Mulgan (2006:155-156) reflects on ‘common pattern of success and failure’ for SIs and looks at favorable societal frame conditions which allow for the emergence of SI. Besides free communication and open access to media, he also names assessable capital as one enabling factor. This links well to some criteria named by the interviewees of this study, such as ‘continued availability of resources’ (no. 16). As hindering factors in the frame conditions Mulgan mentions ‘unresponsive’ governmental actors, which again can be linked to the criteria named for this study, such as ‘institutional support’ (no. 22). Another reference is made toward a lack of adequate promotions mechanisms to scale the innovations up, which resonates with some of the stated criteria (e.g. no. 6: ‘process spread around the whole country’). Rösing Agostini et al. (2017:395) then differentiate between the micro- (individuals), meso- (organizations), and macro-level (whole movement) of SIs. This would also entail different measurements for success and failure. Here some criteria named in this study, such as ‘increased awareness’ (e.g. no. 12) would fit to the micro-level linking to single actors, while other criteria, such as ‘intermediary found who is trusted’ (no. 5) could better be linked to the meso-level focused on relationships between involved organizations. And criteria such as ‘process spread around the whole country’

(no. 6) could be accommodated under the macro-scale.

4.2. Discussion of method

4.2.1. Strengths of the method

The applied Process-Net-Map method seems well suited to capture the interviewees' perceptions on the innovation process in terms of the occurred events, involved actors, encountered challenges and experienced 'star moments'. Interviewing several involved actors for the same case and capturing their respective perceptions allows for validation of results to some degree, e.g. by comparing if different interviewees name the same events and/or actors. The method yields very rich data, including both quantitative and qualitative information. This can be attributed to the participatory nature of the method which invites interviewees to engage in the visualization of development process of the innovation while in parallel explaining why a certain event was important or which role a certain actor performed in this event. From the qualitative information captured in the interview transcripts, additional variables can be generated, e.g. as has been done to identify typical roles of actors. To this effect, quantitative information, mostly contained in the Process-Net-Maps, and qualitative data, recorded in the interview transcripts, complement each other. Through the co-creation process of the Process-Net-Maps, participation for the interviewee can be realized, which also underpins learning processes and easily allows for corrections by rearranging event or actor cards. The method is also highly flexible and jumping back and forth between questions in the interview guidelines is possible, supporting a more natural flow in the conversation and enabling the interviewee to add things when they come to mind.

4.2.2. Weaknesses of the method

The method is quite time and resource-consuming, both for the interviewee and the interviewer. On average interviews can take between two and four hours, and transcribing the interview recordings and conducting the content analysis of the transcripts is very time-demanding, too. Furthermore, some gaps in the collected information can result, because interviewees are reluctant to speculate about some actors' motivations or their levels of influence and benefit. Also, the number of potential interviewees is limited, as already pointed out in the method section. Because results are based on the perception of the interviewees they might carry some bias, as some information might be wrongly remembered. This might be more relevant when interviewees are asked to recall events which happened far back in time. Different perceptions might also correlate to some extent with actors' attributes. For instance, local actors might identify in the first place local events and local actors, while national actors might contribute more to identifying events and actors at the higher governance levels. Looking into the interdependencies between the attributes of the different interviewees and their perceptions of the innovation process would offer a complementary angle for the analysis. Another problematic issue can arise when answer categories are not pre-defined (e.g. as done for actors' motivations, and criteria for success and failure) as this makes comparisons across cases harder (but also produces more rich data). Altogether, the method allows for an in-depth analysis of complex governance processes and to gain detailed insights into each case.

5. Conclusion

In this study, the emergence and development processes of three FES governance innovations, framed as SIs, was analyzed. To do so, the participatory and interview-based Process-Net-Map method was used to

generate a narrative for each case and to visualize the innovation process, placing relevant events and joining actors along a timeline. Despite the contrasting characteristics of the three individual cases, in view of the addressed governance levels (national vs. regional vs. local), their development stages, and the targeted FES (supporting vs. regulating vs. cultural), clearly recognizable pattern could be observed. They allowed for generalizations in regard to the typical roles that actors take on during the process, the types of actions situations in which they interact with each other, and the criteria named for success and failure of the innovation process.

In regard to the identified actors' roles, all roles represent crucial skills which are needed to initiate the innovation process, but even more importantly, to continue it over time. Special attention may be given to the role of antagonists, as they can exert a negative (oppose the idea), but also positive (pointing out existing flaws) influence on the innovation process.

In regard to the identified action situations, each involves a specific set of actors and also varies in the number of engaged actors. For a continuation of the innovation process it seems crucial that the initial smaller core team can win additional partners to push forward with the testing and implementation of the idea and also draw enough interest from stakeholders as the potential beneficiaries of the innovation as well as public media who help in promoting the idea further.

In regard to the named criteria for measuring success and failure, it can be summarized that similar criteria were named across cases, including criteria applicable at micro-level (e.g. increased environmental awareness of single individuals preparing the way for improved FES governance solutions), meso-level (e.g. intermediary found who brokers between different crucial actor groups needed), as well as macro-level (e.g. enabling framework conditions for the innovation).

With its results, the study contributes to the existing body of literature in two ways. First, it contributes to a better understanding how the innovation processes were initiated and maintained over time. This carries the potential to better understand how governance change could be actively triggered or where in the process support to overcome obstacles ('challenges') or to accelerate developments ('star moments') could best be provided. Obtained results can also be used to inform other studies with a similar research focus. Second, it contributes to the advancement of the applied method by demonstrating how it can be used in the analysis of innovation processes, also reflecting upon its particular strengths and weaknesses to allow for further improvements by others researchers interested in the use of the method.

Future research on the investigated topic could include using the method to gain a more nuanced understanding of different actors' perceptions of the innovation process, e.g. between the involved actors from practice vs. research. Another route for future research could be to zoom in on particular roles, such as the intermediary role. In the context of trans-disciplinary projects, such as the 'InnoForEST-project, a more in-depth analysis of which different roles the involved science partners can play and how this supports the innovation processes could be another way forward.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Annex.

Annex 1 Actors' abbreviations and their attribute data (grey field = no data)

						Actors' roles							Actors' motivations*														
						Innovator	Provider	Doer	Influencer	Intermediary	Antagonist	Influence	Benefit	Duty	Image	Economic	Contest	Adventure	Creativity	Learning	Awareness	Knowledge	Social	Regional	Intrinsic	Ecological	Sustainability
FN	CER	Future certifier	private	national				1									1										1
FN	EUP	EU-project InnForEst and involved team members	hybrid	international		1	1	1	1	1		5															
FN	FCO	Companies from forestry sector (small + big)	private	local-international			1	1	1	1		1	2-5	3				1						1		1	
FN	FEI	Team from Finnish environment institute	public	national		1	1	1	1	1		4-5	3-4	1				1								1	
FN	FFC	Team from Finnish Forest Center	public	national		1	1	1	1	1		3-5	3-4	1		1							1	1		1	
FN	FNI	Innovator (wrote letter to editor, affiliated to FEI/MEN)	public	national		1	1	1	1	1		5	4														
FN	FOW	Forest and land owners	private	local-regional			1	1	1	1	2	2-5	1		1		1						1			1	
FN	IME	Future intermediary	hybrid	national				1	1	1		1															
FN	INT	Interviewees for Helsinki Challenge	hybrid	national		1	1	1	1																		
FN	MAF	Ministry of agriculture and forestry	public	national			1			1	1	1-5	1-5				1					1	1			1	
FN	MEN	Ministry of environment	public	national			1		1		1	1-5	1-5										1			1	
FN	MNT	Mentors supporting for Helsinki challenge	civil	local-regional		1	1	1																			
FN	NGO	Several environmental NGOs	civil	regional-national							1	3															
FN	P+M	Press + Media	hybrid	national					1			3-4															
FN	PIL	Bigger cities interested in pilots	public	local		1		1	1	1																1	
FN	RAD	Regional administration	public	regional			1	1	1	1	2	1															
FN	TFS	The Finnish Society	civil	national			1	1	1	1	1	1-4	2-3														
FN	UHE	Team from University of Helsinki	public	national		1	1	1	1	1	1	3-5	3-4									1					
FN	UIY	Ecological compensation expert, University of Jyväskylä	public	national		1	1	1	1	1	5	4															
FN	ULP	Law expert, University of Lapland	public	national			1																				
DE	AME	(Inter-)national travel company	private	national-international		1		1				1	0														
DE	ANC	Federal agency for nature conservation (part of CUN)	public	national					1	?		1	0	1										1			
DE	ANE	Academy for sustainable development Mecklenburg-West-Pomerania (MV)	civil	regional		1		1	1	1		5	4								1			1	1	1	
DE	CBY	Corporate buyers of the forest share	private	regional-national			1	1	1			4	4			1										1	
DE	CUN	Committee UN decade responsible to select award winners	public	national			1	1				1	0	1										1			
DE	DEI	Innovator of the forest share (affiliated to MAE)	public	regional		1		1	1	1		5	0	1												1	
DE	EUP	EU-project InnForEst and involved team members	hybrid	international		1	1	1	1																		
DE	GAS	Local gastronomy	private	local-regional			1					4	3				1							1			
DE	ITB	International tourism fair (world's largest tourism trade fair)	private	international				1				1	0			1											
DE	JGT	Jury for tourism prize, prize is awarded by the German tourism association	civil	national				1	1	1	1	0	1														
DE	LCO	Local energy company	private	regional		1	1	1	0		0	4	3			1	1							1	1		
DE	LOI	Initiative 'Germany - land of ideas'	public	national		1		1			0	1	0														
DE	MAE	Ministry of agriculture, environment and consumer protection	public	regional		1		1				5	4	1	1									1			
DE	MUN	Municipalities	public	regional			1					4	4														
DE	NUE	North-German foundation for environment and development	civil	regional			1																				
DE	P+M	Press + Media	hybrid	regional-national				1	1		1	4	0														
DE	PBY	Private buyers of the forest share (to off-set own carbon emissions or as a	private	regional-national		1	1	1				4	4											1	1	1	
DE	PRA	Protection area	public	regional		1	1			1	0	0															
DE	PRE	Federal president (patron of LOI)	public	national		1		1		0	1	0	1												1		
DE	RTA	Regional tourism associations (have different legal forms)	hybrid	local-regional			1	1	1			4	3				1							1			
DE	SCI	Science partners (needed to calculate FES metrics)	public	national						1	1																
DE	SFO	State forest agency	public	regional		1		1				5	4			1								1			
DE	TGP	The general public (citizens visiting the planting events)	civil	regional-national				1																			
DE	TMV	Tourism association of Mecklenburg Western-Pomerania (MV)	hybrid	regional		1		1	1	1		5	4		1									1			
SE	DRO	Dropped-out potential funding partner	civil	national					1	1																1	
SE	EUP	EU-project InnForEst and involved team members	hybrid	national		1	1		1			4	4							1	1		1				
SE	FFU	Potential future funders (different economic sectors)	hybrid	national			1																				
SE	FPA	Potential future participants of Love the forest 2.0	hybrid	local			1																				
SE	FUN	Funding partners from Swedish forestry industry	private	national		1	1	1				4	4			1	1					1					
SE	KID	Participating school kids from local schools	civil	local		1	1					2	4				1	1	1					1			
SE	LUC	Involved Swedish science partner from EU-project	public	national			1															1					
SE	MOD	Facilitator hired to moderate workshops	private	local			1					1	3														
SE	P+M	Press + media	hybrid	regional-national				1	1	1																	
SE	PFO	Partners from Swedish forestry industry	private	national		1		1				3	5			1	1										
SE	REN	Swedish research network	hybrid	national					1			1	1									1					
SE	SCM	Steering committee members	hybrid	national		1		1	1																		
SE	SEI	Swedish innovation idea giver	hybrid	local		1	1	1	1			5	4,5	1		1				1			1		1		
SE	SMU	Science museum	hybrid	city		1	1	1	1	1		4	3,5	1			1				1		1				
SE	STU	Several students involved into data collection	civil	(inter-)national			1					0	5	1						1		1					
SE	TEA	Participating teachers from local schools	public	local					1			4,5	3				1	1	1				1	1			
SE	UNI	Two local universities (founders of SMU)	hybrid	local		1										1					1						

*Please see Annex 2 for how categories named for motivations were consolidated across cases.

*Please see Annex 2 for how categories named for motivations were consolidated across cases.

Annex 2 Overlay in categories named for actors' motivations, and consolidated categories across cases

Named categories for actors motivation per each case			Consolidated categories for all cases
FN	DE	SE	FN/DE/SE
purpose	duty/obligation	duty/carrier	Duty
image/reputation	image	image/reputation	Image
economic	economic	economic/income	Economic
		competition/contest	Contest
		adventure/fun	Adventure
		creativity/inspiration	Creativity
		personal learning	Learning
	raise awareness/education	education/spread knowledge	Awareness
gain knowledge		science/gain knowledge	Knowledge
social		social interaction/networking	Social
regional	regional		Regionality
	intrinsic	heart/intrinsic	Intrinsic
ecological	ecological	ecological/nature	Ecological
	sustainability		Sustainability

Dark orange shading: named for three out of three cases.

Light orange shading: named for two out of three cases.

Annex 3 Actor glossary (all actor abbreviations listed in alphabetical order per case)

Case	Actor ID	Actor name
DE	AME	(Inter-)national travel company
DE	ANC	Federal agency for nature conservation (part of CUN)
DE	ANE	Academy for sustainable development Mecklenburg-West-Pomerania (MV)
DE	CBY	Corporate buyers of the forest share
DE	CUN	Committee UN decade responsible to select award winners
DE	DEI	Innovator of the forest share (affiliated to MAE)
DE	EUP	EU-project InnForEst and involved team members
DE	GAS	Local gastronomy
DE	ITB	International tourism fair (world's largest tourism trade fair)
DE	JGT	Jury for tourism prize, prize is awarded by the German tourism association
DE	LCO	Local energy company
DE	LOI	Initiative 'Germany - land of ideas'
DE	MAE	Ministry of agriculture, environment and consumer protection
DE	MUN	Municipalities
DE	NUE	North-German foundation for environment and development
DE	P+M	Press + Media
DE	PBY	Private buyers of the forest share (to off-set own carbon emissions or as gift for others)
DE	PRA	Protection area
DE	PRE	Federal president (patron of LOI)
DE	RTA	Regional tourism associations (have different legal forms)
DE	SCI	Science partners (needed to calculate FES metrics)
DE	SFO	State forest agency
DE	TGP	The general public (citizens visiting the planting events)
DE	TMV	Tourism association of Mecklenburg-West-Pomerania (MV)
FN	CER	Future certifier
FN	EUP	EU-project InnForEst and involved team members
FN	FCO	Companies from forestry sector (small + big)
FN	FEI	Team from Finnish environment institute
FN	FFC	Team from Finnish Forest Center
FN	FNI	Innovator (wrote letter to editor, affiliated to FEI/MEN)
FN	FOW	Forest and land owners
FN	IME	Future intermediary
FN	INT	Interviewees for Helsinki Challenge
FN	MAF	Ministry of agriculture and forestry
FN	MEN	Ministry of environment
FN	MNT	Mentors supporting for Helsinki challenge
FN	NGO	Several environmental NGOs
FN	P+M	Press + Media
FN	PIL	Bigger cities interested in pilots
FN	RAD	Regional administration
FN	TFS	The Finnish Society
FN	UHE	Team from University of Helsinki
FN	UIY	Ecological compensation expert, University of Jyväskylä
FN	ULP	Law expert, University of Lapland
SE	DRO	Dropped-out potential funding partner
SE	EUP	EU-project InnForEst and involved team members
SE	FFU	Potential future funders (different economic sectors)
SE	FPA	Potential future participants of Love the forest 2.0
SE	FUN	Funding partners from Swedish forestry industry
SE	KID	Participating school kids from local schools
SE	LUC	Involved Swedish science partner from EU-project
SE	MOD	Facilitator hired to moderate workshops
SE	P+M	Press + media
SE	PFO	Partners from Swedish forestry industry
SE	REN	Swedish research network
SE	SCM	Steering committee members
SE	SEI	Swedish innovation idea giver
SE	SMU	Science museum
SE	STU	Several students involved into data collection
SE	TEA	Participating teachers from local schools
SE	UNI	Two local universities (founders of SMU)

Annex 4 Event glossary (all event abbreviations listed in chronological order per case)

Case	Event ID	Event name
DE	DE1	Ministry restructuring
DE	DE2	STERN-report ('The economics of climate change')
DE	DE3	Idea conception
DE	DE4	Climate cube developed, presenting basic facts, e.g. on carbon sequestration in forests
DE	DE5	Concept development
DE	DE6	1st non-public planting event (close to Neustrelitz)
DE	DE7	Own booth at ITB fair (International tourism fair)
DE	DE8	AMEROPA project initiated by Deutsche Bahn (Germany's national train service) to advertise holidays on Rügen (island in the Baltic sea). The tickets included selling of Forest shares to offset the carbon footprint for the 7-days holiday on the island.
DE	DE9	First public planting event (on Usedom, another island located in the Baltic see)
DE	DE10	Award 'Land of ideas' received from Innovation network Germany
DE	DE11	Award UN (United Nations) decade project 'Education for sustainable development'
DE	DE12	Nomination for German tourism prize (the Forest share was listed among the top seven nominations)
DE	DE13	President's reception. Invitation of most innovative projects into the 'Theater of the West' in Berlin
DE	DE14	Large public planting event organized in the Biosphere reserve 'Schaaensee'
DE	DE15	Company investment by large locally based company. For each new customer they invested 10 Euros. Since their first commitment they make a yearly investment and are also involved in the organization of the public planting events for their customers.
	DE16	Yearly public planting event organized (always in Autumn)
DE	DE17	Award UN decade project 'Biodiversity'
DE	DE18	10th anniversary of the Forest share: celebrated with two events, a public planting action close to Fleesensee in combination with a festival with about 200 invited participants organized together with partner from the forestry sector
DE	DE19	Public planting event held on island Rügen
DE	DE20	Again award received from UN decade projects (already awarded projects can be re-certified several times)
DE	DE21	ITB fair/MV, where the federal state Mecklenburg-West-Pomerania (MV) was invited as a partner 'country' of the ITB fair (International tourism fair). This is very unusual as normally only whole countries get invited as partners. A festivity was held at the 'City Cube' in Berlin. The event was made climate-neutral through the Forest share.
DE	DE22	EU-project aided workshops are conducted to assist in the further development of the Forest share
DE	DE23	Future redesign of the Forest share
FN	FN1	METSO (Forest biodiversity program for Southern Finland), initiated in 2008, very successful, provided public funds to forest owners for conservation measures to prevent further biodiversity decline in Finnish forests.
FN	FN2	Private Protection areas can be established, which put conservation easements on the respective land area
FN	FN3	Letter to editor to communicate the idea of ecological compensation to a wider audience sent to the editor of a popular newspaper
FN	FN4	Lunch at FEI to shape the idea further
FN	FN5	Participation in the Helsinki challenge (a science competition regularly held for all 10 national Finnish universities) themed 'biodiversity now'. With the idea for the Habitat bank they win the 2nd prize. The competition involves 4 or 5 rounds with presentations and video pitches, in preparation a row of interviews was conducted with different companies, politicians, and other potentially interested stakeholders
FN	FN6	Press + Media coverage through participation in Helsinki challenge
FN	FN7	Invitation to join in the development of an EU-project proposal where the Habitat bank would be investigated as a case study
FN	FN8	Giant workshop organized with more than 100 participants, with presentations held in Finnish to mobilize a wider spectrum of interested actors to join in the innovation process
FN	FN9	Follow-up workshop, with about 10-20 participants, to concretize the idea further (e.g. matching of sites, contracting, choice of a possible intermediary, etc.)
FN	FN10	Explorative talks with ministries (Ministry for the environment, Ministry for agriculture and forestry) and minister round table organized to explore policy support for the idea of the Habitat bank. Discussion centered around the feasibility and legal aspects.
FN	FN11	Feasibility analysis, conducted without additional funds (grant application was unsuccessful)
FN	FN12	Ad-hoc meetings with up to 10 participants. Meetings were perceived as very productive.
FN	FN13	Key publications published, e.g. on the principles of ecological compensation and feasibility study exploring a regulative and voluntary scenario for the implementation of the Habitat bank, first in Finnish, later also available in English
FN	FN14	Several workshops and seminars organized on the topic of ecological compensation, for some formats also YouTube videos were created, some workshop were combined with panel discussions
FN	FN15	National projekt (EKOTEKO) approved for funding. Aim of the project was to explore the feasibility of ecological compensations in Finland further. Project partners involved partners from science, business and administration.
FN	FN16	Grant proposal for the EU-project (InnoForEst) is successful and the project starts. Funding allows for the organization of further workshops to involve stakeholders for the further development of the idea. First face-to-face meetings with forest owners as potential FES providers take place
FN	FN17	E-Mail list 'habitat cluster' lists about 40 actors all engaged to work on ecological compensation to further knowledge exchange and networking activities
FN	FN18	The website of the Habitat bank goes online
FN	FN19	ECCB (European Congress of Conservation Biology) conference takes place. One day of the conference is dedicated to work on ecological compensation.
FN	FN20	Further stakeholder formats are organized, which include seminars, workshops, and a Delphi study
FN	FN21	In the national project, first pilots in four different locations are implemented and field trips with stakeholders are organized
FN	FN22	Leaflet in Finnish specifically addressed to landowners is elaborated
FN	FN23	A paper which summarizes the results from the workshops conducted in 2016 is published in the Land Use Policy journal
FN	FN24	EU-project-aided workshops are conducted to explore different scenarios for the implementation of the Habitat bank, a priority is given to the voluntary scenario by all involved stakeholders. Unfortunately not all invited stakeholders participate.
FN	FN25	Further stakeholder interviews and meetings are planned in the context of the EU-project
FN	FN26	For piloting screenings of possible privately owned sites close to Jyväskylä is planned
SE	SE1	Redesign of rain forest exhibition planned, therefore partners from the Swedish forestry sector are approached for fund-raising, but they are more interested to finance activities targeted to Swedish forests
SE	SE2	Concept for Love the forest (1st run) is elaborated, addressed to school children. Idea is presented to potential funders and six partners are gained with a fixed budget of 200,000 Swedish Krona (about 20,000 Euros).
SE	SE3	Kick-off and a series of about 10 follow-up workshops are conducted. At the kick-off meeting the steering committee is built (balanced composition between practice and science partners is aimed at). Discussions are partly led very emotional. There are disagreements on how forests should be managed (production vs. conservation-oriented protection). Because of disagreements one funding partner drops out.
SE	SE4	Invitation to join in the development of an EU-project proposal where Love the forest would be investigated as a case study (if proposal is successful)
SE	SE5	Financing plan worked out. Negotiation took quite long, agreement was made that funder commit for two years, payment comes in two annual installments
SE	SE6	Love the forest 1st run implementation (in 2017), contest among school classes, the winning team gets 10,000 Swedish Krona. Teams had two tasks: a) suggest activities to promote experiencing the forest (e.g. for newly arrived swedes, for families), and b) develop innovative forest products. The run was a full success, places were fully booked already in late 2016
SE	SE7	EU-proposal successful, Love the forest becomes a case study in the project, two involved partners, one from practice, one from science, become formal project partners with their own budget
SE	SE8	Workshop series is held with about 30-40 participants, among them also the teachers of the participating school classes and the science partners from the EU-project, to collect feedback
SE	SE9	Love the forest 1.0 final event held at the science museum, school children presented their ideas to a jury, a promotional movie was made
SE	SE10	Press + media coverage: the final event received some coverage, but the science museum had hoped for more attention
SE	SE11	InnoForEst kick-off takes place, where Love the forest is presented as a case study
SE	SE12	An 'inspiration day' to collect ideas for the 2nd run of Love the forest is organized. Participants include the teachers as well as funding partners and partners from science in a first workshop. A second workshop for the school childrens follows. At both workshops a survey is conducted to collect feedback systematically
SE	SE13	Obtained results from the workshops are summarized in a report for evaluating the 1st run.
SE	SE14	A change in the steering committee is made for the 2nd run of Love the forest. CEOs (who are too busy to really get involved) are replaced by employees from PR and marketing
SE	SE15	Concept for the 2nd run of Love the forest is developed, this time addressed to older school children with the task to elaborate ideas for communicating 'sustainability'. But no classes sign up, because it does not fit with their school curriculum. Thus, the museum goes back to the concept of the 1st run.
SE	SE16	Financing plan for the 2nd run is worked out. High pressure is exerted from the science museum that the 2nd run should generate some profit.
SE	SE17	2nd run of Love the forest is implemented (2018). It is again evaluated as a success with a very good cooperation among the members of the changed steering committee.
SE	SE18	A very hot summer diminishes visitor numbers at the museum. Some staff is laid off to compensate for decrease in profits
SE	SE19	Love the forest final event takes place at the museum
SE	SE20	Surveys are conducted with teachers and about 400 school children from the participating school. Results from surveys are summarized in a report for evaluating the 2nd run of Love the forest.
SE	SE21	Interviews with funding partners to ask about their feedback and explore their willingness to continue with another run of Love the forest.
SE	SE22	EU-project assisted workshop series is organized to collect ideas for a redesign of Love the forest (version 2.0). Different scenarios are explored (create forest experiences for new swedes as 'wild kids', realize a 'certified outdoor guide' for disabled persons or awareness raising for 'climate change' issues). Workshops are facilitated by an external mediator. Not all invited participants participate. The funding for Love the forest 2.0 is still unclear.
SE	SE23	Further activities for the redesign and fund raising of Love the Forest 2.0 are planned for the future

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