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Learning Landscape Approach through Evaluation: Opportunities for Pan-European Long-Term Socio-Ecological Research

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Abstract

Sustainable development as a societal process aimed at securing sustainability is challenging. To encourage the necessary knowledge production and learning in different social-ecological contexts requires a place-based networking research infrastructure that involves multiple academic disciplines and non-academic actors. Long-Term Socio-Ecological Research (LTSER) platform is one approach with ~80 initiatives globally. To encourage transdisciplinary learning through evaluation we defined a normative model for ideal performance at both local platform and network levels. Four surveys were then sent out 67 self-reported LTSER platforms. Focusing on the network level, we analyzed the spatial distribution of both long-term ecological monitoring sites within LTSER platforms, and LTSER platforms across the European continent. Finally, narrative biographies LTSER platforms in different stages of development were analyzed. While the siting of LTSER platforms represented biogeographical regions well, variations in land use history and governance arrangements were poorly represented. Ecosystem research (72%) dominated social system research (28%). Maintenance of a platform required 3-5 staff members, was based mainly on national funding, and had 1-2 years of future funding secured. Networking with other landscape approach concepts was common. Individually, and as a network, LTSER platforms have good potential for transdisciplinary knowledge production and learning about sustainability challenges. To benefit from the large range of variation among Pan-European social-ecological systems we encourage collaboration among different landscape approach concepts such as LTSER platform and Model Forest, ecological reference landscapes like zapovedniks as well as traditional systems for landscape stewardship.

Keywords: European continent, landscape approach, learning through evaluation, LTSER platform, Model Forest, social-ecological system, stakeholder engagement, transdisciplinary research

Introduction

As a complement to the ecosystem services approach in land use policy, governance and planning, implementation on the ground requires skills to navigate the complexity of interactions within landscapes as social-ecological systems. It is essential to focus both on sustainable development as a societal process (Baker 2006), and on ensuring sustainability in social-ecological systems. Landscape is a well-established concept that can aid knowledge production and learning by fostering transdisciplinary knowledge production and learning (Angelstam et al. 2013). This requires integration of researchers and other knowledge producers representing different disciplines, as well as stakeholders representing different sectors at multiple levels (Termoshuizen and Opdam 2009).

To maintain natural capital through functional green (ecological) infrastructure (e.g., European Commission 2013), thereby enhancing human well-being, modified landscapes often require capacity-building in social systems, and action through conservation, management and restoration in ecological systems. To scale up research and development in support of sustained delivery of ecosystem services is a challenging task (Angelstam et al. 2017a). It requires identification of the acceptable level of modification of the biophysical environment (e.g., Manton and Angelstam 2018), place-based coordination of human management of land and water resources, as well as engaging and incentivizing stakeholders and actors to act sustainably (e.g., Dawson et al. 2017). The general term landscape approach captures this complex web of interactions (Axelsson et al. 2011, Sayer et al. 2015, Angelstam et al. 2019a). A wide range of landscape approach concepts aimed towards place-based knowledge production and engaged stakeholder collaboration have emerged (Angelstam and Elbakidze 2017). One such concept is the Long-Term Socio-Ecological Research (LTSER) platform (e.g., Haberl et al. 2006, Singh et al. 2013, Gingrich et al. 2016, Bretagnolle et al. 2018). Currently there are ~80 LTSER platform initiatives globally (Mirtl et al. 2018). The LTSER network emerged as a bottom up process, where existing local and national initiatives became part of a network and recognized at the European level (Singh et al. 2013). Enhancing collaboration among LTSER platforms at the international level is the next desirable level of ambition towards using multiple landscapes as a laboratory (Angelstam et al. 2019a,b, Holzer et al. 2018).

While landscape approach is commonly advocated, and implementation of initiatives is often highlighted as success stories, formal audits against a norm that states what should be delivered are rarely made. Hence, it is difficult to assess the contributions of different landscape approach concepts in terms of what they actually deliver on the ground. The term learning through evaluation concept captures this challenge (Lähteenmäki-Smith 2007).

The aim of this chapter is to report on a recent audit by Angelstam et al. (2019a) about the extent to which European LTSER platform initiatives live up to the LTSER platform concept's own norms developed for place-based knowledge production and learning towards sustainable landscapes. First, we defined a normative model for the ideal performance of LTSERs at platform and network levels. Second, we analyzed the location of platforms across Pan-European gradients of biophysical, anthropogenic and intangible interpretations of landscape. Third, we sent out four surveys with increasing complexity to 67 self-reported LTSER platforms. Fourth, we compiled narrative biographies for 18 LTSER platforms in different development stages. The discussion focuses on two dimensions. First, how can landscape approach concepts such as LTSER can be sustained as local hubs of problem-solving landscape laboratories, and how they can form a research infrastructure. Second, we advocate learning among different landscape approach concepts such as LTSER platform and Model Forest (Angelstam et al. 2019b), ecological reference landscapes like zapovedniks (Shtilmark 2003) and traditional approaches to landscape stewardship in rural landscapes (Angelstam and Elbakidze 2017, Fedoriak et al. 2019).

Methods and materials

Normative model

To assess performance of individual LTSER platforms, we developed a normative model by integrating Grove's et al. (2013) architectural metaphor of "siting, construction and maintenance" of individual LTSER platforms, and Mirtl's et al. (2013) triangle of region and actors (i.e. landscape as a coupled social-ecological system), research, infrastructure and co-ordination (Figure 1). This approach resulted in four criteria and generation of 16 indicators for which verifier variable data were collected (Table 1).

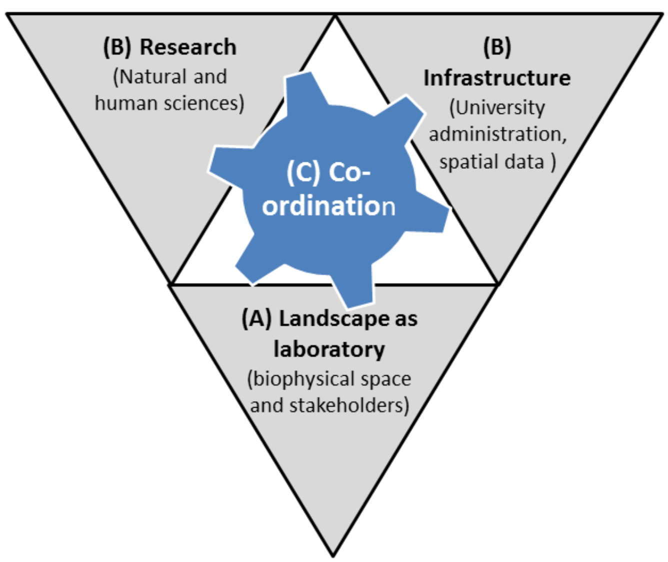

Figure 1. Landscape approach according to the architectural metaphor of the LTSER platform concept (Grove et al. 2013, Mirtl et al. 2013) involves (A) siting a landscape as a socio-ecological system laboratory and engaging stakeholders in knowledge production and learning, (B) constructing by integrating researchers from different disciplines and securing an infrastructure for collecting and analyzing quantitative and qualitative data, and (C) maintaining continuous facilitation and co-ordination to sustain transdisciplinarity (see Table 1).

Table 1. Criteria and indicators developed by Angelstam et al. (2019) for the assessment of LTSER platforms as (1) a place-based research infrastructure based on Grove's et al. (2013) architectural metaphor "siting-construction-maintenance" (A, B, C) for individual platforms, and (2) for LTSER platforms as a distributed network (D).

Criterion	Indicator
Siting (A)	1. Ecoregional representation 2. Representation of anthropogenic change 3. Representation of intangible interpretations
Construction (B)	4. Human vs. natural science research 5. LTER sites in LTSER platforms 6. Stakeholder structure (at least 5 partners) 7. Land ownership structure
Maintenance (C)	8. Number of full time workers 9. How funding is spent on main functions 10. Funding sources 11. Duration of secured future funding 12. Past survival
Network (D)	13. Reaction frequency 14. Response time 15. Opportunity for socio-ecological analyses 16. National support

To visualize the locations of LTSER platforms, we created a standardized platform area of 10,000 km^2 (Figure 2). The rationale is three-fold. First, this size is indicated in LTSER guidelines (100-10,000 km^2, Mirtl et al. 2008). Second, from an ecological point of view, we relied on the area requirements of focal species (Lambeck 1997), meaning that a planning unit should be in the order of 1,000-10,000 km^2 (Angelstam et al. 2004 p. 435). Third, from a social system perspective people generally do not commute more than 1.5 hours per day, i.e. corresponding to ca 50-60 km one-way travel distance by car or train (e.g. Lindelöw 2018), hence also ca. 10,000 km^2.

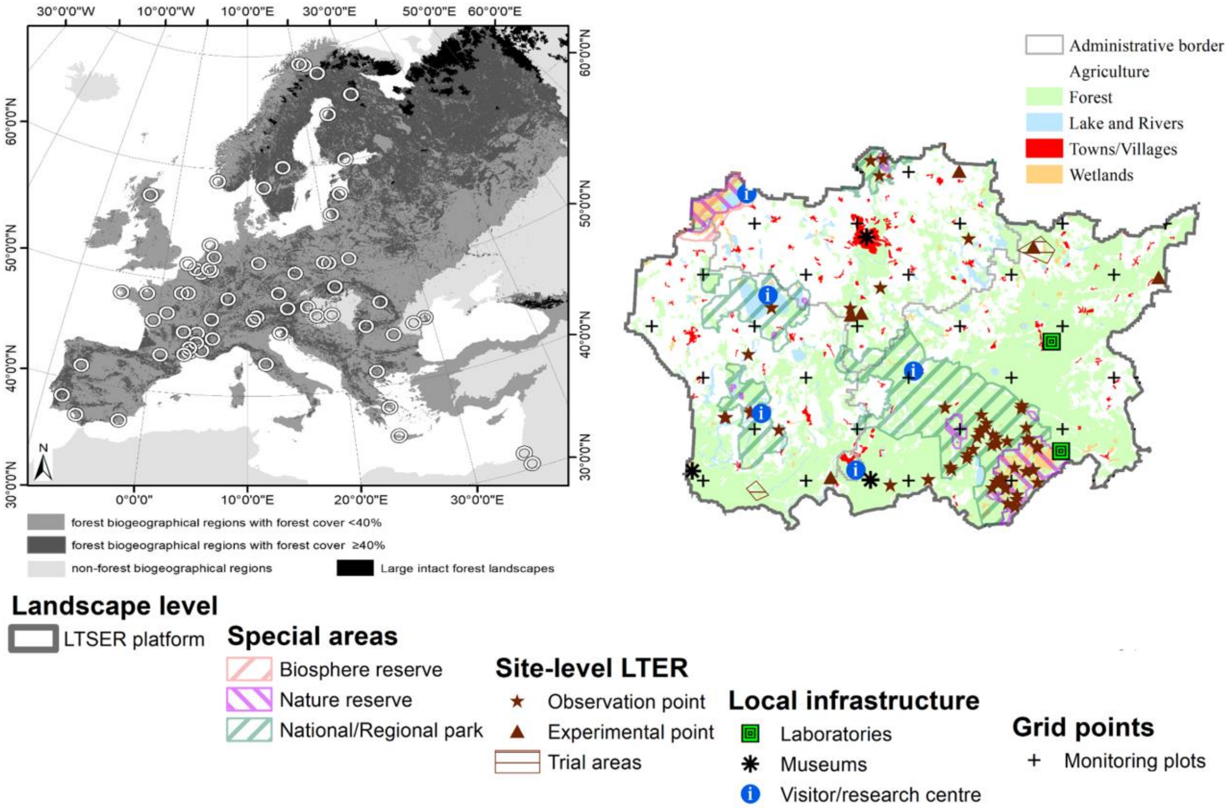

Figure 2. LTSER platforms provide opportunity to address large spatial extents and both ecological and social system research topics (Metzger et al. 2010), as well as how they interact (Singh et al. 2013). The figure illustrates how 67 LTSER platforms form a multi-level place-based research infrastructure in Europe. Nested within LTSER platforms (from left to right) in a fictive LTSER platform there are special areas such as Biosphere Reserve and National Park, LTER (Long-Term Ecological Research) sites that focus on ecosystem monitoring comprising highly instrumented Master Sites, Regular Sites and Satellite Sites, as well as local infrastructure and monitoring grid points (e.g., Mirtl et al. 2013 p. 417). Globally, this research infrastructure comprises ~ 80 long-term socio-ecological research (LTSER) platforms and ~ 700 LTER sites (Mirtl et al. 2018).

To collect verifier variable data that matched the 16 indicators in Table 1 we sent out four surveys. Survey-1 aimed at identifying the individuals responsible for LTSER platform co-ordination, ecological system research and social system research in each platform. Survey-2 focused on characterizing the construction and maintenance of an LTSER platform. Survey-3 was designed as an on-line web tool which LTSER platforms could use to check that the GIS polygon of their platform was correct, and if needed draw or adjust its shape directly. Finally, Survey-4 focused on evaluating the extent to which and how LTSER platforms work with green infrastructure as a key transdisciplinary topic to address the supply and provision of ecosystem services in the LTSER platform areas as social-ecological systems.

LTSER platforms in different development stages as case studies

We also collected case study narratives for 18 LTSER platforms (Table 2). Having emerged as bottom-up initiatives in different settings, today's LTSER platforms represent a wide gradient from those just interested in embarking on the LTSER concept, and to those that have been active for >15 years. The case study narratives were structured by the four assessment criteria (1) siting, (2) construction and (3) maintenance of individual platforms on one hand, and cross-platform (4) networking on the other (Table 1). From these structured narratives we extracted and summarized the key themes for each criterion. In the results section quantitative indicators are reported first, and then the results from the case study narratives.

Table 2. Case study narratives were collected for 18 LTSER platforms in different stages of development, and analyzed with respect to the four LTSER platform criteria siting, construction, maintenance and networking (see Table 1).

LTSER platform (code according https://data.lter-europe.net/deims/site/)	Country	Years of operation as a LTSER platform (up to 2019)	Area (km^2)	Number of local administrative units
Waddensee (lter_eu_nl_001)	Netherlands	3	6155	17
Engure (lter_eu_lv_01)	Latvia	9	644	5
Oracle/BVRE Orgeval (Seine river basin), (rbv_fr_05; part of lter_eu_fr_002)	France	30	1200/78,000	16/8,400
Negev Highlands (lter_eu_il_017)	Israel	5	1700	2
Roztochya (lter_eu_ua_004)	Ukraine	Potential	280	10
Tovel lake (lter_eu_it_090)	Italy	Potential	90	1
Doñana LTSER Platform (lter_eu_es_001)	Spain	11	2,736	12
Plaine and Val de Sevre (lter_eu_fr_009)	France	19	435	24
Poloniny National Park (lter_eu_sk_010)	Slovakia	2	342	10
Braila Island (lter_eu_ro_006)	Romania	18	2,597	25
Bergslagen (lter_eu_se_001)	Sweden	8	44,000	40
Eizenwurzen (lter_eu_at_001)	Austria	15	5,904	91
Lithuanian coastal site (lter_eu_lt_004)	Lithuania	Abandoned	NA	NA
Helsinki (lter_eu_fi_002)	Finland	13	745	3
Arava (lter_eu_il_016)	Israel	10	1,650	1
Baixo Sabor (lter_eu_pt_002)	Portugal	10	1,590	5
Montado-Alentejo (lter_eu_pt_001)	Portugal	8	32,700	53
Chernivtsi region	Ukraine	Potential	8,097	11

Results

Siting

The 67 LTSER platforms represented 23 countries. In terms of biophysical interpretation of landscape there was good coverage of LTSER platforms in the Alpine, Boreal, Atlantic, Continental and Mediterranean biogeographic regions (Indicator A1). Gradients of anthropogenic land cover change are an important feature allowing design of comparative studies of the effects of anthropogenic factors on ecosystem services, such as across LTSER platform areas. Forest is the most widespread potential natural land cover in Europe and ranges from lost to present but modified and intact forest landscapes. The location of LTSER platforms only in the western half of the European continent means that intact forest landscapes that can be used as reference landscapes (e.g., Naumov et al. 2018) are missing (Indicator A2). Similarly, an example of an intangible interpretation of the landscape concept, countries with the full range of governance arrangements values were not represented, thus missing important constituent social system variables (Indicator A3).

The qualitative results from the 18 narratives studies of LTSER platform initiatives illustrate the European diversity of local and regional social-ecological contexts. Three groups of landscape types had LTSER platforms. The first was rural agricultural landscapes in different development stages. The second involved river catchments and coastal areas, both of which forming gradients from urban settings including urbanization and industrial decline via agricultural areas in different socio-ecological transition, and to protected areas of different kinds. The third group was formed by historic informal regions in steep socio-ecological gradients with complex governance legacies linked to different land ownerships and landscape histories, both within countries and in cross-border regions.

Construction

Survey-1 showed that the three functions LTSER platform co-ordination, responsibility for ecological and social science research, respectively, was served by one person (39% of the platforms (n=28)), two persons (50% of the platforms) and three persons (11% of the platforms). Research on ecological systems (73%) outnumbered research on social systems (27%). All LTSER platforms had at least one LTER site. Concerning the profile of stakeholder participation in spatial planning for biodiversity conservation and human well-being (indicator B6) and land ownership (indicator B7) there was a clear focus on the local and regional levels.

The narratives showed that the construction of LTSER platforms included both top-down to bottom-up approaches. The first came out of national level competitive initiatives to develop LTSER platforms with the aim to enable integrative research about ecosystem services together with stakeholders. The second group was formed by national parks, municipalities and regional planning units that realized the need for integrated land planning to cope with socio-economic pressures on landscapes as social-ecological systems, and biodiversity conservation through promotion of sustainable landscape development and integrated planning. The third group was LTSER platforms the establishment of which was triggered by concrete drivers for knowledge production and learning bottom-up, such as declining human population and demographic challenges in rural areas, need for landscape restoration, a severe flooding event, securing water quality, river damming for hydroelectric use, decline of charismatic focal farmland birds and threats to beekeeping. These initiatives led to monitoring projects, later evolving into research projects at local, regional and international levels, which over time did or may transform into transdisciplinary research gathering ecologists, economists and social scientists as well as stakeholders.

Maintenance

The LTSER platforms' most frequently mean number of full-time workers (indicator C8) was 3-5 persons, but almost the same proportion of the respondents said 1-2 persons (n=29). Research (ecological 29%, social 11%) accounted for the largest funding expenditure for the platforms (indicator C9). Other expenses included data collection (26 %), co-ordination (16 %), travels in the field (12%) and stakeholder engagement (7%) (n=29). Regarding funding sources (indicator C10) almost 90% of the LTSER platforms relied on national grants, and about 50% of the platforms were supported by EU grants as well as from regional sources (n=29). The "duration of secured funding" (indicator C11) was short-term. Most commonly funding was secured for only 1-2 years (37 %) in advance. About 30% of the LTSER platforms reported funding for the next 3-5 years (n=29). "Long-term survival" (indicator C12) was assessed by comparing data for 2010 with those for 2016. Of the 30 platforms listed in 2010, only three had disappeared by 2016.

Analysing the narratives, we identified three mechanisms to sustain a more or less loose researcher-stakeholder network as a key foundation for a LTSER platform. First, some platforms had permanent staff based at a national research institute or university, with a desire to do LTSER platform work. National and regional funding in successive shorter periods was frequently complemented with mainly disciplinary short-term projects. Long-term monitoring of biodiversity and socio-economic data were key assets in emerging, young and long-lived LTSER platforms. Second, skills to identify key topics, and to write proposals to secure and sustain multiple minor short-term sources were combined with a patchwork of disciplinary research, post-graduate, and consulting projects. Wise integration of funding for research and stakeholder engagement can transition into transdisciplinarity. Third, to survive some LTSER platforms exercise opportunistic use of short-term research funding through participation in national and EU-projects, however, this may be insufficient to sustain desired monitoring initiatives and to allow time for preparing peer-review publications.

Networking

To assess the reaction frequency to the four surveys (indicator D13) at the network level we analyzed their response rates. Surveys 1-4 were answered by 28, 29, 21 and 14 respondents, respectively. In total, 43 LTSER platforms responded to at least one of the four surveys. LTSER platforms that had delivered polygons in Survey-3 had a significantly higher response rate. To assess LTSER platforms as a communicating network of place-based research, we used as a proxy the frequency of occurrence of LTSER platforms that responded to four different surveys and how fast they responded to them in relation to the requested 14 day limit (Indicator D14). In the first survey all but one of the 28 platforms that responded met this requirement. With increasing survey complexity response times became longer. The opportunity for analysing socio-economic data collected at the level of public administrative units (Indicator D15) was estimated by comparing our estimates of how large (i.e. 10,000 km^2) a sufficiently sized LTSER platform ought to mirror the size of a sufficiently large areas that reflects both ecological and social system analyses comprehensively on one hand, and the size of administrative units at different levels of governance on the other. Of the 43 LTSER platforms for which a polygon could be attributed, a total of 18 were 1000 to 10000 km^2 in size and 8 met the requirement of

10,000 km^2. For those 43 platforms with boundaries in DEIMS-SDR a total of 50% were supported by their respective host countries.

Finally, networking with other LTSER platforms, but also with other landscape approach concepts, was widespread. This included Model Forest, EU LEADER, Ramsar, UNESCO Biosphere Reserve, UNESCO Global Geopark, Zone Atelier, World Heritage Site, zapovednik and, as well as a wide range of professional and researcher networks.

Discussion

Comparisons with the normative model for LTSER platforms

Long-Term Socio-Ecological Research (LTSER) emerged in response to the recognition of increased effects of human activities on sustainability at local to global levels (Singh et al. 2013, Mirtl et al. 2018). These challenges can often be considered as wicked (Duckett et al. 2016), which calls for transdisciplinary knowledge production and learning (Angelstam et al. 2013, Holzer et al. 2018). The LTSER platform concept aims at being a place-based infrastructure that supports collaborative knowledge production and learning by academic and non-academic participants (Haberl et al. 2006, Singh et al. 2013). As a network, the ambition is to develop context-specific solutions by drawing upon multiple LTSER platforms representing biophysical, anthropogenic and intangible properties of landscapes as social-ecological systems (e.g., Matthews and Selman 2006, Metzger et al. 2010). Based on mixed quantitative and qualitative methods Table 2 provides an overview of the compliance with the normative model.

Table 2. Opportunities for improvement of LTSER platforms' performance as place-based research infrastructure.

Criterion	Indicator	Opportunities for improvement
Siting (A)	1. Ecoregional representation	-
	2. Representation of anthropogenic change	Include reference areas representing ecological integrity and resilience
	3. Representation of intangible interpretations	Include wider gradients of governance and political cultures
Construction (B)	4. Human vs. natural science research	Strengthen the role of humanities and social sciences
	5. LTER sites in LTSER platforms	Encourage macroecological approaches
	6. Stakeholder structure	-
	7. Land ownership structure	-
Maintenance (C)	8. Number of full time workers	-
	9. How funding is spent on main functions	Increase proportion funding spent for humanities and social sciences
	10. Funding sources	Funding at EU-level need to support also local LTSER platforms
	11. Duration of secured future funding	Need to encourage longer term funding
	12. Past survival	-
Network (D)	13. Reaction frequency	Develop incentives for cross-platform collaboration
	14. Response time	Develop incentives for cross-platform collaboration
	15. Opportunity for regional meta-analyses	Compare macroecological and socio-economic data
	16. National support	Increased support from north and east European countries

The siting of LTSER platforms affects the opportunity to design macroecological research, natural experiments and comparative studies of government, governance and politics. From this point-of-view, the European LTSER platforms represent the socio-ecological diversity within the EU well (Metzger et al. 2010). However, parts of important socio-economic, landscape history and governance gradients that exist on the entire Pan-European continent are missing from this network. For example, many post-Soviet countries are missing (e.g., Russia, Belarus, Ukraine), and some platforms are no longer functioning (e.g., Lithuania). The absence of large intact forest landscapes as reference areas for ecological integrity, and of regions with clearly top-down governance with low levels of democracy are two examples. The first example can be illustrated by studies on the effect of habitat amount and configuration on biodiversity (e.g., Roberge et al. 2008), and the effects of large herbivores on trees (Angelstam et al. 2017b). Similarly, comparative studies of different governance arrangements illustrate that different societal trajectories require solutions that are adapted to both stakeholder engagement patterns and spatial planning legacies (e.g., Elbakidze et al. 2010, 2013).

At the network level a critically important dimension of a landscape approach research infrastructure is that it covers wide gradients in all dimensions of landscape. First, this involves capturing the full gradient of ecosystem state (Naumov et al. 2018, Manton and Angelstam 2018). Second, the network needs to cover a wide range of social systems, such as from bottom-up democratic governance to top-down authoritarian (e.g., Elbakidze et al. 2010). To achieve this, the LTSER network needs to establish platforms outside the EU as well as collaborate with other concepts.

The Soviet zapovednik system for strictly protected areas, including monitoring data and phenological letters of nature (Shtilmark 2003), is a grand infrastructure to build on. However, problems with funding of both place-based research and other research are widespread in Post-Soviet countries. For example, in Ukraine, the situation deteriorated significantly in the years after independence in 1991, Slovakia was in a similar situation before entrance to EU in 2004, and Lithuania's LTSER Platform no longer functions due to the withdrawal of governmental support, although there is interest from the communities of international landscape approach concepts and local research sector to reinvigorate. Although EU funds helped to improve the situation, impacts of the previous regime can be felt. Thus, the most efficient way to develop a network in such countries with limited financial opportunities would be to implement EU projects that are dedicated to support the establishment of a LTSER platforms network in both EU and former post-Soviet countries.

Concerning the construction of LTSER platforms, the addition of the "socio"-component to already established long-term ecological monitoring/research sites is not straightforward. This is reflected both by a dominance of ecological research according to our survey work, and a dominance of ecological research in peer-review publications (Dick et al. 2018). Nevertheless, the same study demonstrated that the trend over time is positive for social science contributions from LTSER platforms. Moving from research restricted to natural science or human science research towards transdisciplinary knowledge production through collaborating researchers, practitioners and citizens means a radical change in the way knowledge production is carried out and how infrastructure for this is built (Holzer et al. 2018). There is often epistemological and methodological friction when engaging in transdisciplinary research (e.g., Furman and Peltola 2013, Mirtl et al. 2013).

So far, the LTSER platform concept has been viewed through an ecosystem and natural science lens. To balance this, the LTSER platform concept also needs to incorporate the perspectives of social sciences and the humanities. To achieve this, mutual respect from both cultures of human and natural science research (*sensu* "two cultures" of Snow (1959)), respectively, is required. Developing a transdisciplinary research agenda overarching multiple LTSER platforms, and facilitating researchers' and stakeholders' ability to participate in processes of knowledge production and learning would be an important contribution.

The qualitative approach based on 18 narratives corroborates the quantitative analysis. The narratives demonstrate the long period from the appearance of a transdisciplinary idea to its realization, and that collaboration among different landscape approach concepts was common (e.g., Angelstam and Törnblom 2004 and Axelsson et al. 2013, Bretagnolle et al. 2018). While on the one hand this can be an obstacle for establishing a place-based distributed network of landscape approach initiatives as research infrastructure (see http://www.lter-europe.net/elter-esfri), a positive pragmatic approach is to encourage collaboration in different constellations of LTSER platforms based on their characteristics. Finally, the size of LTSER platform areas matters. Addressing interactions between macroecological patterns and processes on the one hand and governance, political cultures and socio-economic factors on the other, requires platform areas that are sufficiently large to contain multiple territorial units that can provide such data.

Landscape approach and traditional landscape stewardship

Landscape approach entails a collaborative effort of researchers, stakeholders, practitioners and policy makers towards bottom-up projects and actions to promote a sustainable development process and sustainability in their own place and region (Axelsson et al. 2011, Sayer et al. 2015). This can be called social innovation (Moulaert et al. 2005). Creative actions, social participation, collaboration among different levels of decision making and different sectors of society are all common features of social innovation. The necessary conditions for developing place-based transdisciplinary research representing different social-ecological contexts include: (1) existence of long-term data about ecological and social systems, “compass” *sensu* Lee (1993), (2) sufficient time for developing collaborative capacity, “gyroscope” *sensu* Lee (1993), and (3) sufficient coordination (Angelstam and Elbakidze 2017).

The main goal of social innovation from the perspective of landscape approach is to facilitate that a place-based, permanent and renewable change takes place toward a more equitable and sustainable society. Neumeier (2012:55) defined social innovation as “changes in attitudes, behaviors or perceptions of a group of people joined in a network of aligned interests that in relation to the group’s horizon of experience lead to new and improved ways of collaborative action within the group and beyond”. It can thus help address important challenges for local communities and stakeholder groups. This is urgently required to address the interconnected wicked challenges of economic development, ecological integrity, and social justice that are essential components of human well-being through a stronger territorial basis (e.g., Duckett et al. 2016). This calls for revival of collective action (Primdahl et al. 2018), which can be sought both through analyses of past local collective systems for landscape stewardship, and where they remain in terms of for example different types of landscape stewardship in traditional village systems (Angelstam and Elbakidze 2017, Fedoriak et al. 2019, see Figure 3).

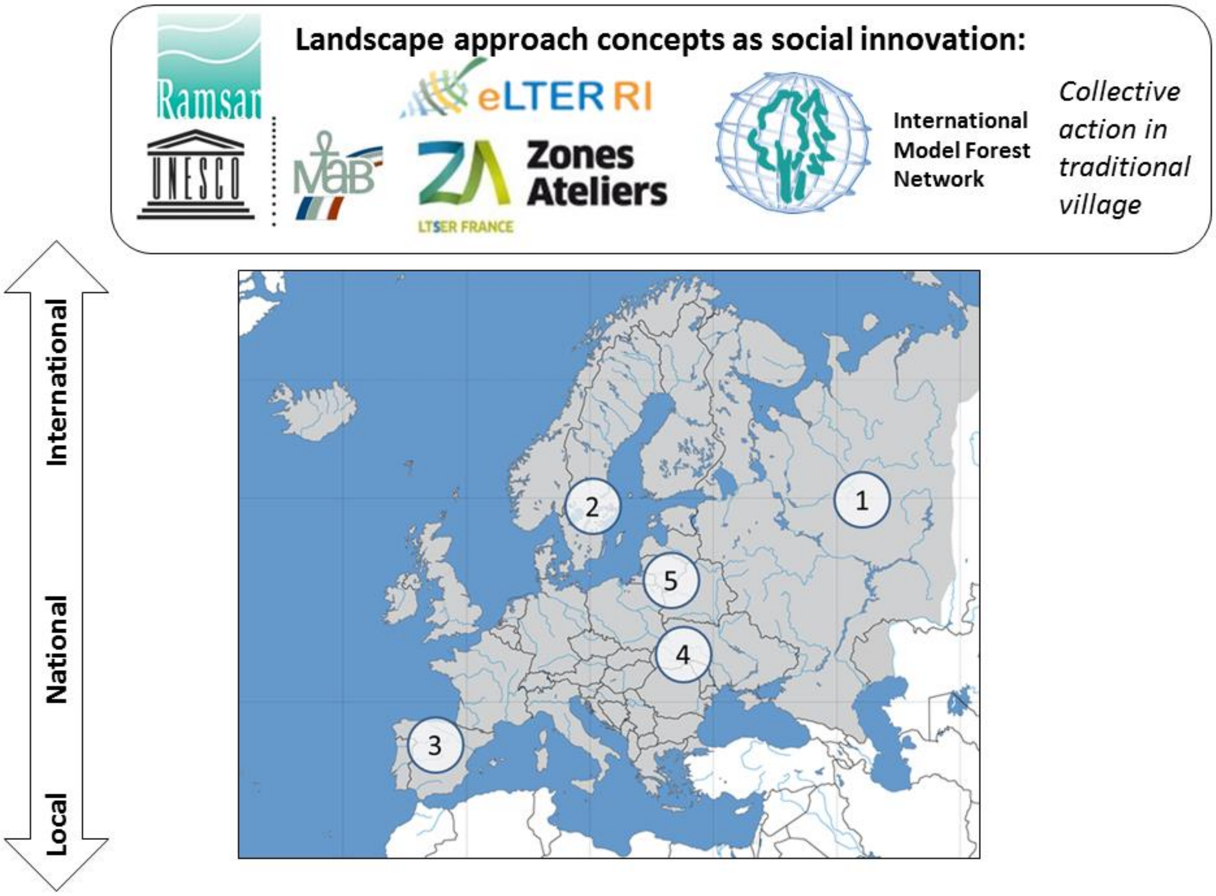

Figure 3. Our vision is that place-based initiatives working with different landscape approach concepts, and traditional forms for landscape stewardship, would exchange experiences about knowledge production and learning towards sustainable landscapes. The authors of this chapter represent (1) Komi Model Forest (IMFN (2008) in Russia (initiative emerged 1997), (2) Bergslagen Model Forest and LTSER platform in Sweden (initiative emerged 1999), (3) Palencia Model Forest candidate in Spain (initiative emerged 2015), (4) Beekeeping as a form of collaborative learning in Chernivtsi, Ukraine (initiative emerged 2014/15), and (5) the Lithuanian State Forestry Enterprise, which was established in 2018 (https://www.vivmu.lt/en/), is looking for approaches to stakeholder collaboration.

There is thus potential for integration among different landscape approach concepts and initiatives as a research infrastructure (Figure 3). This would enhance the use of Pan-European gradients in biophysical, anthropogenic and intangible interpretations of landscapes for knowledge production and learning towards sustainable social-ecological systems. This needs to be matched by effective bridging of barriers in terms of competition between organizations and concepts that focus only on their own version of what a landscape approach means. We therefore encourage wide use of our systematic approach to learning through evaluation (see also Angelstam et al. 2019a, b).

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