Author(s): Raatikainen, Kaisa; Barron, Elizabeth S.

Title: Current agri-environmental policies dismiss varied perceptions and discourses on management of traditional rural biotopes

Year: 2017

Version:

Please cite the original version:

Raatikainen, K., & Barron, E. S. (2017). Current agri-environmental policies dismiss varied perceptions and discourses on management of traditional rural biotopes. Land Use Policy, 69, 564-576. https://doi.org/10.1016/j.landusepol.2017.10.004

Current agri-environmental policies dismiss varied perceptions and discourses on management of traditional rural biotopes

Kaisa J. Raatikainen[1]* & Elizabeth S. Barron[2]

[1] University of Jyvaskyla, Department of Biological and Environmental Science, P.O. Box 35, FI-40014 University of Jyväskylä, Finland
[2] University of Wisconsin Oshkosh, Department of Geography and Urban Planning, 800 Algoma Blvd., Oshkosh, WI 54901-8642, U.S.A.
*Corresponding author. E-mail: kaisa.raatikainen@jyu.fi

Traditional rural biotopes (TRBs) are threatened habitats that host significant biodiversity and several ecosystem services, and depend on active management such as low-intensity grazing. The current study explores private landowners' decision-making on TRB management and abandonment within a social-ecological system framework. We provide insight into supporting resilience of TRB systems in the face of agricultural modernization. Using a mixed methods approach with content analysis and Q analysis, we demonstrate that TRB management fosters cultural, biological, aesthetic, and utilitarian values. These are reflected in different ways through conservationist's, profit-oriented farmer's, landscape manager's, and landscape admirer's discourses on TRB management. Overall, management reinforces landowners' place attachment, and reflects an approach to landscapes as spatial representations of cultural heritage and identity over multiple generations. Landowners consider TRB pasturage and its social-ecological outcomes motivating and rewarding. Giving up grazing cattle and perceived bureaucracy of national agri-environment scheme contribute to TRB abandonment. Landowners point out that current policies detach TRB management from what is seen as "regular agriculture", and the focus on monetary compensation bypasses the multiple values tied to TRB management. Based on our results, we suggest that promoting TRBs requires reconfiguring the current arrangement of remedial management payments and adopting a more participatory governance approach. Locally, resilience of TRB systems relies on the connections between landowners and landscapes that foster sense of place and landscape identity, which can be supported by knowledge sharing and collaborative grazing efforts among landowners.

Keywords: *cultural ecosystem services; Finland; high-nature-value farming; semi-natural habitats; social-ecological systems; resilience*

https://doi.org/10.1016/j.landusepol.2017.10.004

1. Introduction

Agricultural intensification threatens maintenance of traditional farming systems, which have historically shaped a variety of rural landscapes and fostered a significant amount of biodiversity and cultural heritage in Europe (Benton et al., 2003; Plieninger et al., 2014, 2006). Consequently, there is increasing public expenditure and scientific interest in conservation of farmland biodiversity (Batáry et al., 2015; de Snoo et al., 2013; Kleijn and Sutherland, 2003). Of special conservation concern are semi-natural habitats managed by low-intensity grazing or mowing, such as different types of meadows and wood-pastures, which support several threatened species (Halada et al., 2011).

In Finland, semi-natural grasslands and wood-pastures are collectively referred to as traditional rural biotopes (TRBs). TRBs are defined as culturally influenced natural habitat complexes that are part of a traditional landscape formed through archaic rural livelihoods (Ministry of the Environment, 1992). This official definition acknowledges how ecological and social factors are intertwined in the concept of TRBs, depicting them as social-ecological systems. Yet, in practice, TRBs are detected and evaluated mainly based on ecological qualities, particularly specific vascular plant species assemblages surveyed in the field (Pykälä et al., 1994). As a result, TRBs are generally perceived through ecological patterns and processes as species-rich semi-natural habitats maintained by human-induced intermediate disturbances (e.g., Raunio et al., 2008). Ecocentric perspectives such as this permeate the scientific research concerning European agri-environmental policies targeting biodiversity conservation (de Snoo et al., 2013). Agri-environmental policies to enhance biodiversity and landscape quality are unsustainable when social-ecological interactions are unnoticed, simplified, or disregarded (de Snoo et al., 2013; Pelosi et al., 2010). Thus, a more pluralistic offset that takes social aspects into account would benefit conservation policies, management actions, and ecological outcomes (Bennett, 2016).

Despite its importance, incorporating social science into farmland biodiversity conservation efforts is challenging. The multiplicity and complexity of agricultural social-ecological systems makes their management an elusive task (Berkes et al., 2003; Cash et al., 2006; Pelosi et al., 2010). Since 1980s, member states of European Union started to launch agri-environmental schemes (AESs) with the principle of paying farmers for undertaking desirable conservation-oriented actions. Although the AESs aim for supporting environmentally-friendly and less intensive farming as a livelihood (Clark et al., 1997; Robinson, 2005), their benefit for biodiversity has been questioned on several occasions (Batáry et al., 2015; Kleijn and Sutherland, 2003; Robinson, 1991). Several studies have noted that if the causes of agri-environmental problems are not well understood and AESs are therefore not appropriately designed, their implementation can be ineffective or have unintended effects (Uthes and Matzdorf, 2013).

Despite their “patchy” effectiveness, AESs have become the main tool to conserve farmland biodiversity throughout Europe (Batáry et al., 2015; Kleijn and Sutherland, 2003; Uthes and Matzdorf, 2013). Due to the voluntariness of AESs, a number of studies have explored

farmers' motivations to adopt the schemes. Such information is usually derived from interviews or surveys targeted to farmers either participating in AESs or not (Uthes and Matzdorf, 2013). Factors explaining AES uptake include age, likelihood of having a successor, and sufficiency of financial incentives (Prager et al., 2012; Uthes and Matzdorf, 2013); also ease of management (Morris, 2006), interest in wildlife (Herzon and Mikk, 2007; Matzdorf and Lorenz, 2010), and a will to maintain landscape aesthetics (Birge and Herzon, 2014) are important motivators. Additionally, these findings could benefit from a holistic approach that aims to synthesize a range of issues affecting farm-level decision-making. Furthermore, as studies specifically target farmers, they rarely include other landowners whose land-use decisions are undeniably important in conserving biodiversity.

One approach to better understand issues on conservation of farmland biodiversity is to study the renewal of rural social-ecological systems such as TRBs. Social-ecological systems are dynamic and deal with change; they sustain themselves as a function of the system's adaptive capacity (Berkes et al., 2003). A key property of this process is resilience: the capacity of a social-ecological system to remain within the same regime, essentially maintaining its structure and functions, despite the external perturbations or other stressors disturbing the system (Holling, 1973; Resilience Alliance, 2017). Given that the evolution of European Union's Common Agricultural Policy (CAP) has been guided by the principles of ensuring rural stability by guaranteeing occupancy of agricultural land and emphasizing the importance of small-scale and family farming (Clark et al., 1997), a resilience-oriented farm-level approach to AESs seems justified. Here a farm is seen as a social-ecological system; stressors are externally imposed ecological, social, or economic changes affecting farming, such as climate change or fluctuations in market prices; the ability of the farm enterprise to react to these changes through modifying but not giving up farm production reflects the adaptive capacity; and regimes are relatively stable combinations of farming practices that form the basis of the farmer's livelihood through alternative land uses. The role of AESs in this context is to build social-ecological resilience by supporting environmentally and socially sustainable farming practices.

Social-ecological resilience is particularly important for social groups that are dependent on ecological and environmental resources for their livelihoods (Adger, 2000). These include farmers and landowners managing TRBs. Their decisions on whether to continue TRB management or to abandon it have a direct connection to TRB conservation. Given the urgent need to increase the number of managed TRBs in order to safeguard the biodiversity dependent on them (Heikkinen, 2007; Raatikainen et al., 2017), knowledge on the resilience of TRB systems within contemporary agricultural context needs to be gathered.

In this paper, we apply a social-ecological approach to TRBs by focusing on two phenomena that reflect decision-making on TRB management on different levels: subjective perceptions and communal discourses. Bennett (2016) defines "perception" as "the way an individual observes, understands, interprets, and evaluates a referent object, action, experience, individual, policy, or outcome", and states that studying perceptions provide insight and indispensable evidence for monitoring, evaluating, and adapting conservation programs and

policies. Although perceptions are subjective, they are to some extent socially influenced and thus share commonality, and are further reflected in socially shared discourses (Barry and Proops, 1999). Discourses are "structured ways of representation that evoke particular understandings and may subsequently enable particular types of actions to be envisaged" (Hugé et al., 2013). They guide practices and reflect underlying values (Benitez-Capistros et al., 2016; Hugé et al., 2013). Understanding and contextualization of discourses is a prerequisite for evaluating the social acceptability and sustainability of environmental policies (Barry and Proops, 1999; Benitez-Capistros et al., 2016; Hugé et al., 2013). Long-term effectiveness of conservation actions is ultimately enabled through local support (Bennett, 2016; de Snoo et al., 2013), and together perceptions and discourses affect the design, implementation, and outcomes of different environmental policies.

The paper is structured as follows. First, based on literature, we present how TRBs can be incorporated into a social-ecological system framework. Second, we empirically explore the resilience of TRB systems through landowners' perceptions and discourses on TRB management. Here we aim to understand the landowners' motivations for TRB management or abandonment, and investigate the role of the national AES in TRB conservation. Our driving research question is: What kinds of social-ecological factors underlie maintenance of TRBs in the context of current Finnish agriculture? We hypothesize that landowners' personal values, feeling of place attachment, and knowledge of land-use history are more important to TRB conservation than agri-environmental policies. Based on our findings, we interpret emerging new meanings related to TRBs and discuss how these fit into current governance practices. Ultimately we argue TRB management will benefit from resilience-oriented policies targeting key variables that are attendant to landowners' decision-making strategies for successful TRB management.

2. Conceptualizing management of traditional rural biotopes as a social-ecological system

Contemporary TRB management has its roots in practices of traditional 19th century subsistence farming, where cattle husbandry was based on natural resources derived from the landscape surrounding the farm (Soininen, 1974). Although social-ecological systems such as this are inherently complex, their composite parts can be identified for structural analyses (Ostrom, 2007). This conceptual partitioning is important for achieving a better understanding of the systems and developing effective policies to improve their performance (Ostrom, 2007). In the following, factors relating to contemporary TRB management are categorized into four social-ecological subsystems: resource system, resource units, governance system, and actors (Ostrom, 2009, 2007). Because of conceptual and historical similarities, we parallel TRBs with Pan-European semi-natural grasslands and wood-pastures, but specify aspects particular to Finland within the text.

TRBs are special types of agricultural resource systems that are tied to long-term, low-intensity cattle husbandry. They share four key unifying characteristics: 1) dependence on mowing or low-intensity grazing (Mládková et al., 2015; Pykälä, 2000), often accompanied

by other multifunctional actions such as coppicing, pollarding, and pruning (Hartel and Plieninger, 2014); 2) long-term usage as unfertilized pastures or meadows, resulting in nutrient impoverishment (Kumm, 2003; Mládková et al., 2015; Pykälä, 2000); 3) exceptional biodiversity (Halada et al., 2011; Pykälä, 2000); and 4) decline in contiguous coverage due to agricultural modernization (Plieninger et al., 2006; Raunio et al., 2008).

The resource units derived from TRBs are various. In Finland, TRBs have traditionally been used to collect fodder for livestock; dung from pastures to fertilize fields; and wood from wood-pastures (Ministry of the Environment, 1992). Many of these old land-use practices have nearly vanished. Still, grazed TRBs provide pasture, and the importance of quality meat production on TRBs is growing (Birge and Herzon, 2014). Across Europe, TRBs also provide a multitude of non-agricultural ecosystem services such as cultural heritage and scenic beauty (Birge and Fred, 2011; Birge and Herzon, 2014; Plieninger et al., 2015a; Stenseke, 2006; Sutcliffe et al., 2013). Yet, the most material benefit to Finnish TRB managers is the monetary compensation of management costs paid for via national AES (hereafter "payment"). The AES promotes voluntary environmentally-friendly agriculture by incentivizing farmers for providing desired environmental benefits, which are regularly inspected (Armsworth et al., 2012; Kaljonen, 2006). In year 2012, Finnish farmers received a total of 8.4 million euros of payments for covering costs of TRB management, comprising 2.4% of the total AES expenditure (Aakkula and Leppänen, 2014).

In Finland, management of TRBs is the single most effective AES measure in terms of promoting biodiversity (Aakkula and Leppänen, 2014; Grönroos et al., 2007; Kuussaari et al., 2004). As a consequence, the governance, funding, and advisory services on TRB management are arranged around the implementation of the national AES.

The emergence of an AES-based governance system on TRB management has introduced a range of new actors that are involved in TRB-related decision-making. As agricultural issues are central for national politics, politicians play an important role in development and implementation of agri-environmental policies. Tasks of targeting and channeling management funding to TRB managers is decentralized to several officers working in Finnish authorities, which include two ministries, three national agencies, and 15 regional administrative organizations (Raatikainen et al., 2017). A number of NGO employees and volunteers provide assistance for managers in AES-related issues, e.g. by giving advice on payment application process and supervising farmers' interests; or they may themselves conduct TRB management. In addition, there are a variety of actors with other connections to TRB management, such as academic researchers, consumers, and local community members.

Yet key actors in TRB management are farmers and landowners who may or may not actively manage their land. Increasing costs in agricultural inputs, volatile markets, and ageing of farmers drive collapses of traditional farming systems, leading to TRB abandonment (Beilin et al., 2014). However, individual-level idealism, tradition, and landscape aesthetics counteract abandonment (Birge and Herzon, 2014; Kumm, 2003;

Stenseke, 2006). Finnish farmers appreciate agricultural heritage and cultural landscapes, and reflect these values through childhood memories related to TRBs (Kaljonen, 2008).

As centres of value, TRBs foster and reflect specific identities. For managers, TRB management often invokes a strong sense of place, defined as a feeling of belonging that results from an experienced reciprocal linkage between places and people, mediated by personal active sensory participation with a place (Howard et al., 2013). For communities and their members, TRBs contribute to landscape identity, i.e. the perceived uniqueness of a place, where "perceiving" is both a personal and social matter, and "uniqueness" is based on the interaction between spatial and social factors (Stobbelaar and Pedroli, 2011). Nationally, because of the importance of agrarian history for Finnish national identity, TRBs are an essential part of Finnish cultural heritage (Ministry of the Environment, 1992). Thus TRB management contributes to the evolution of place-related identity, which includes an affective bond to the place and cognitive representations giving the place a special character or entity (Loupa Ramos et al., 2016). Sense of place, landscape identity, and cultural heritage develop from the interaction between people and their environment, and we argue they have an important role in maintenance of TRBs. The focus of our study is the analysis of the practical aspect of these interactions.

Although deriving key social-ecological components offers valuable information for policy-making, Ostrom's framework's approach to social-ecological systems is structural, not interpretive. Therefore complementing it with discourse analysis gives insight into how people themselves view the system in question. Discourse analysis is able to reveal underlying patterns or meanings in people's beliefs and opinions with a focus on verbal interaction, dialogue, and practices in which these shared meanings are embedded (Creswell, 2009; Hugé et al., 2013; Webler et al., 2009). Thus it provides policy-makers a better understanding on how to apply the refined social-ecological knowledge.

3. Material and methods

3.1 Overview on methodology

This paper uses a social constructivist framing to explore discourses and perceptions, rather than ascribing to fixed categories or ideas (Creswell, 2009). A mixed methods approach was used to gather complementary qualitative and quantitative data sets. We chose a case study approach to collect data, and interviewed TRB landowners to study the relationship between policy and practice. We limited the study to a selection of TRB sites within the province of Central Finland, but the landowners of the sites did not have to live in the region. In both Central Finland and Finland in general, urbanization has created a situation where non-farming urban residents increasingly own rural family estates and TRB sites located on them, and this group was of special interest for us. Including both farmers, and non-farmers detached from farming livelihoods and everyday living environments, allowed us to examine a broader diversity of cultural and social meaning related to TRBs and TRB management.

We analyzed interview transcripts qualitatively in two phases: firstly in inductive and secondly in a deductive manner (Elo and Kyngäs, 2008). Specific perceptions that emerged from the interviews were analyzed first, giving initial insight for different social-ecological aspects of TRB management. In order to attain a more coherent interpretation, we next utilized Elinor Ostrom's social-ecological system framework (McGinnis and Ostrom, 2014; Ostrom, 2009, 2007). In this deductive part of our analysis we related the initial perceptions to Ostrom's holistic framework, and studied their connections. We chose this framework because it was developed for analyzing social-ecological systems from a sustainability perspective, meant to directly inform policy development (Ostrom, 2009). The framework functions as a diagnostic tool for analyses on how attributes of social-ecological systems jointly affect and are indirectly affected by interactions and outcomes achieved at a particular time and place (Ostrom, 2009, 2007). The framework also relates social-ecological systems to larger socioeconomic, political, and ecological settings, thus enabling matching governance arrangements to specific problems embedded in a social-ecological context (Ostrom, 2007).

To better contextualize our qualitative findings, we derived shared discourses, interpreted as different ways of explaining, reasoning, and valuing TRB management. We gathered data on how landowners agreed on general statements related to TRB management, and analyzed the data using Q methodology, a quantitative method to assess subjectivity (Stephenson, 1935).

Finally, we interrelated the emergent perceptions, social-ecological system properties, and discourses to each other in order to examine how landowners consider and process their decision-making on TRB management or abandonment in relation to current agri-environmental policies.

3.2 Data collection

The interviews were conducted in January and February 2015 by first author. Variation was incorporated in initial purposive sampling of TRB sites by 1) dispersing the sites spatially within Central Finland, 2) choosing sites surrounded by variable coverage of agricultural landscape, and 3) contacting landowners with a range of backgrounds. A total of 26 landowners were contacted, and from them, 20 landowners of 14 TRB sites volunteered to participate in the study. Four landowners refused to participate referring to their old age; the other two did not provide any specific reason for their refusal. Six participants had met the interviewer at least once on an earlier occasion. Participants were grouped into "managers" or "non-managers" based on whether they actively managed their TRB site themselves (Table 1). This categorization reflects decisions on whether to continue or to abandon TRB management. Site locations and surrounding landscape structure are shown in Figure 1.

The landowners chose the location for the interview, which was usually in their home. If the farm had more than one landowner that was responsible for land-use decisions, all landowners were interviewed together. Note that here and henceforth we refer to landowner's property generally as "farm", even though farming may have ended, or the landowner may

have rented the fields out and would not farm him/her-self. The interviews were audiorecorded with landowners' permission.

The first part of the interview included a semi-structured discussion around three themes relating to the owned TRB property: Farm and its history, change in surrounding landscape, and the TRB site itself. The second part of the interview included Q-sorting, where landowners individually ranked a curated selection of TRB-related statements according to their level of agreement or disagreement with each statement. Details of this procedure are given in section 3.4 (Q analysis).

Thirty seven hours 45 min of interview data (resulting in 526 pages of transcripts) were transcribed verbatim using WAVPedal 7 (Programmers' Consortium, Vienna, VA).

3.3 Content analysis

Content analysis of interviews explored landowners' personal perceptions on TRB management or abandonment. Data handling, coding, and documentation of the analysis were done in ATLAS.ti (version 7.5.7). Ostrom's social-ecological system framework (*sensu* McGinnis and Ostrom, 2014) was used in structuring the coding scheme used in the analysis, thus directly connecting the interview data to the social-ecological system theory.

In initial stages of the analysis, transcribed data were read through and emerging, repetitive meanings within it were detected. These meanings provided the foundation for 40 codes, which were then used to code all data accordingly (this is intended to be a somewhat circular process to draw out the underlying meaning and discourses in textual data). The codes were then grouped into five code families: management decision-making and practices, knowledge on land-use history, agri-environment scheme, sense of place, and landowner subjectivities.

Code- and code family -based queries were run in order to identify specific sections of relevant text. When purposeful, these queries were run separately for managers and non-managers in order to detect differences in the perceptions of these two groups. After each query, resulting quotations were read through and notes written to a memo.

In order to detect key social-ecological variables, we paralleled our coding scheme with Ostrom's social-ecological system framework, which was outlined in section 2 (Conceptualizing management of traditional rural biotopes as a social-ecological system). In addition to the framework's subsystems (actors, resource system, resource units, governance system), its main components include action situations and outcomes, related ecosystems, and social, economic, and political settings (Ostrom, 2009, 2007). All of these include second-tier variables that affect the patterns of social-ecological interactions and outcomes (McGinnis and Ostrom, 2014). In our analysis, each code was defined as relating to one social-ecological component and a corresponding second-tier variable was sought for. For managers and non-managers separately, we detected ten most often co-occurring codes within the code families "landowner subjectivities" and "management decision-making and practices". For the social-

ecological system variables that corresponded to these codes, detailed insights were derived from the interview transcripts.

3.4 Q analysis

Q-analysis focused on discourses on TRBs and TRB management, reflecting the values and priorities related to TRBs on a general level (Barry and Proops, 1999; Robbins and Krueger, 2000; Stephenson, 1935). The procedure started with identification of the body of information about the research topic, following Webler et al. (2009). The main source materials were published TRB manager interviews (Raatikainen, 2012) and meeting documents of the Biodiversity and Landscape working group that was called together upon the preparation the AES 2014–2020 (Ministry of Agriculture and Forestry, 2014). The source materials were read through and TRB-related assertative quotes were systematically collected. From this set of 135 initial statements we extracted 60 final statements that reflected the diversity of opinions around TRB management.

During interviews, landowners ranked the statements according to their agreement. The scale ranged from "least how I think" to "most how I think", with a neutral position in the middle. The sorting was laid out in a normal distribution that guided the landowners to make distictions among their priorities (how they related the statements to each other). During and after sorting, landowners were encouraged to ask questions, give comments, and clarify ranking of specific statements. The sorts were recorded by writing down the ranks of individual statements.

Latent patterns in sorting of the statements were analyzed with factor analysis using PQMethod (release 2.35). Factor analysis reduced redundancy and drew attention to inter-subjective ordering of the statements. The information was further condensed by exploring correlations between variables, i.e. Q sorts done by landowners (n=19). Using principal components analysis with Varimax rotation, we clustered the sorts into four factors for further analysis. Together the factors explained 63% of the variance within the data. In this solution, every Q sort loaded to (i.e. correlated with) at least one of the factors. Thus, all landowners were connected to one or more factors.

Factor scores and arrays, distinguishing statements, salient statements, and landowners' comments were used for the development of descriptive narratives (Electronic appendix). These were interpreted into general discourses on TRB management.

4. Results

4.1 Key social-ecological factors affecting landowners' motivations for TRB management

We identified 16 key variables that contributed to TRB management continuation. Here we connect them to Ostrom's social-ecological system framework in order to structure the complexity of TRB systems (Fig. 2).

Based on both managers' and non-managers' accounts, grazing animals are the most important resource in contemporary TRB management (Fig. 2: RU). Fodder and AES payments were of secondary importance. For some managers grazers provided primarily income or meat, while several others enjoyed the sight of grazers in the landscape and connected with the animals (Table 2). Non-farming managers arranged grazers on their TRBs by collaborating with cattle farmers who lent their animals for summer pasturage. Eight landowners were involved in this purposeful co-operation between farms that resulted in self-organizing grazer networks. Transferring animals within these networks was important in securing the continuation of management, since all non-managers mentioned that a key factor contributing to TRB abandonment was giving up grazing cattle.

Historical management practices, especially grazing, were seen as the best ones by both managers and non-managers (Fig. 2: I). Yet the knowledge on historic land-use and livelihood was guiding rather than restrictive, as contemporary TRB management utilizes modern farming practices; e.g. the continuance of grazing often was secured by changing the type of grazers on the basis of what animals were available. When compared to mowing, all landowners agreed that grazing is the most viable way to manage TRBs, facilitating and motivating TRB management (Table 2).

Managers and non-managers had differing ideas regarding their TRB as a resource system, which was likely a result of different levels of involvement with the land itself (Fig. 2: RS). Managers focused on the site-specific biotic qualities; they described how species community and vegetation dynamics of the TRB form a basis for its value, providing an ecological feedback system through which TRB management practices are adjusted. Non-managers, on the other hand, adopted a landscape perspective. They saw the TRB as part of the overall scenery, with high value on human-constructed facilities such as buildings, fences, and yards.

Managers highlighted the importance of management outcomes tied to the ecological characteristics of the TRB site (Fig. 2: O). They felt that the correspondence between the aims and observed results of the management was rewarding. Through management – usually grazing – they maintained desired features of vegetation such as openness and species richness, and provided habitat for rare species. Clearly, overall continuity of TRB management and persistence of the biotic qualities of the TRB site are important motivators for management.

Non-managers relayed some negative comments related to governance of TRB management (Fig. 2: GS). They saw that the regional administrative organization (ELY Centre) discouraged TRB management through top-down control. Landowners experienced the AES as bureaucractic and burdensome, but they related this to the entire programme rather than to TRB payments, which all landowners considered as advantageous (Table 2). They agreed that payments are needed because TRB management, especially fencing, is expensive. Managers were more accustomed to the AES and said it had only minor effects on their decisions on

TRB management. They claimed that entering the AES did not directly change their management practices.

Both managers and non-managers discussed their role in TRB management (Fig. 2: A). On the one hand, landowners wanted to treasure TRBs as special places having intrinsic value. On the other hand, manager's profession was important. Incorporating TRB management to active farming or connecting it to alternative livelihoods as a side-business or a hobby were mentioned as viable options in securing continuity of management.

Non-managers raised additional features that contributed to continuation of TRB management (Fig. 2: A). Owners of family farms saw the work of ancestors as a motivator for TRB management, and they wished that future generations would continue farming. Landowners felt that they had a responsibility to protect the land for future generations, since each generation holds possession of it only temporarily. They connected landownership to a sense of belonging to the place – the farm – and to the chain of generations. Landowners' knowledge on TRB history and ability to detect patterns of past land uses from the landscape motivated and inspired management.

Both managers and non-managers explained how socioeconomic drivers behind TRB loss have become visible through land-use changes (Fig. 2: S). For example, they described how urbanization has resulted in depopulation of rural areas and abandonment of TRBs. Land uses are the main sculptor of landscape, and landowners structured functions of their farm spatially based on different forms of land use, which were dynamic and related to prevailing livelihoods: older landowners described how meadows were transformed into fields through intensification of agricultural production, and fields re-forested when farming seized.

In relation to other ecosystems, landowners perceived TRBs nested within the surrounding landscape (Table 2, Fig. 2: ECO). They acknowledged how TRB management essentially transforms landscapes, building landscape identity over multiple generations. Thus the relationship between landscape and TRB management is reciprocal and dynamic, making landscape of material and conceptual significance in TRB management.

4.2 Discourses reflecting emergent meanings tied to TRB management

Four underlying discourses were interpreted from the factor analysis (Table 3; see also Electronic appendix). They represent different holistic ways of translating, structuring, and understanding the social-ecological complexity of TRB management (Fig. 2). All discourses emphasized three main points: continuing TRB management and other agricultural practices significantly maintain biodiversity in Finland; because of this overall importance, the responsibility for TRB management should not be left to farmers alone; and the role of authorities in promoting TRBs is minor. Although participants agreed that AES payments covered management costs sufficiently, they generally did not rank scheme-related statements high. This implies that the AES was not considered driving TRB management.

Excluding these similarities, each discourse represents different points of view that were agreed upon by slightly differing groups of landowners. Following paragraphs present the discourse descriptions together with selected excerpts from the interviews that exemplify each discourse. These include data from both the content and Q analyses, which are synthesized and interpreted together.

4.2.1 Conservationist's discourse

According to the first discourse, TRB management creates concrete clusters of manifold values which need active sustaining. This discourse accounted for the greatest amount of variation in the data (Table 3) and several perceptions related to it emerged from the interviews (Table 2); among them was a predominant view of TRBs as places or specific sites having intrinsic value. During interviews, landowners addressed the value of TRBs in several ways. They justified management with place-bound uniqueness of TRBs, or emphasized specific values, such as biodiversity, cultural heritage, and aesthetic scenery. To protect these values, managers highlighted the importance of continuity, which they defined across temporal, social, and ecological dimensions:

TRB management is [about] maintaining culture, old practices and past ways of life, for future generations. It is good for them to see where we came from, how rural areas have developed. Of course the plants and other biodiversity are passed on at the same time. I am sure that people will highly value this work in the future, as long as we can keep the little that is left. (Participant 3, male manager)

In addition to communal value, managers also personally felt that managing their site invoked joy, pride, and enthusiasm. This is evident in the following quotation from a landowner, whose Q sort was strongly associated with the discourse (Fig. 3A):

When I look out, I feel greatly satisfied. I see how the TRB site is getting more and more beautiful. It is so concrete how the work bears fruit. My understanding of TRBs and biodiversity has increased, and as my knowledge has gotten deeper I have learned to see what TRB management means to nature. The scenery makes me feel good about the work I have done. I am touched by it. (Participant 2, female manager)

Her description exemplifies how hands-on work strenghtens the manager's relationship with nature and the surrounding landscape. This leads to a mutual interaction where positive experience, emotion, and ecological knowledge together support management and improve its environmental outcomes and vice versa. Landowners expressed this affinity to the surrounding landscape, and management actions further reinforced their experienced sense of place:

I sit on that rock and just enjoy being there, in that moment, feeling at home. Maybe I manage the TRB in order to thrive in it, and when I do, I just look at the landscape. It is my

territory. Because I know every rock, every spot… it is mine, my home. And by home I really mean the surrounding environment, not only the house. (Participant 15, male manager)

Following from the strong feeling of landownership, managers saw themselves as links in the chain of generations fostering this valued landscape. The idea of intrinsic value of TRBs was so strong that all landowners rejected the idea of payments as a primary motive for TRB management. The contributors to the first discourse further stated that conserving nature was more important to them than receiving money to compensate for management actions; for this reason, the discourse was named as a conservationist's discourse. According to it, monetary compensation through AES was seen as potentially diverting TRB management from its actual value basis:

Maybe, if we were offered more information on TRBs, rather than always told to apply for AES payments, we could see the versatile opportunities in TRB management. (Participant 8, female manager)

Landowners emphasized how TRB management contributes to biodiversity as a whole, and they were worried about the decline of TRBs as a result of agricultural modernization. One of the managers wished that the AES could be modified to better promote TRB management:

The AES should move towards paying for provision of ecosystem services. It would bring TRB management to the same line with other production sectors, and farms could specialize in it, in producing biodiversity. (Participant 1, female manager)

As the two previous quotes show, managers were aware of possible indirect negative consequences of agri-environmental policies on TRB management. They pointed out that although the AES seeks to remedy environmental issues caused by agriculture, it simultaneously is part of a system that holds industrialized production as a norm, thus promoting further degradation of the environment. Managers claimed that this conflicts with overall aims of biodiversity conservation. In terms of TRB management, they feared that short-term payment contracts threaten the continuity of management and leave ecological targets unattained. In the AES, TRB management is described as a voluntary special measure that is conceptually separated from other farming practices. Managers criticized this delineation between "regular" agriculture and TRB management; they saw that the AES marginalizes TRB management and detaches TRBs from everyday farming.

4.2.2 Profit-oriented farmer's discourse

The second discourse focused on the effects of agri-industrial practices and possible drawbacks for TRB management. Whereas the conservationist's discourse presented TRBs as sites or patches holding specific value, the second discourse approached them at the farm level. Generally, TRB management is seen as a low priority generating little profit, because agricultural modernization has diminished the role of TRBs in contemporary farming. What motivation there is for TRB management is utilitarian: the incorporation into farms' livestock

production drives management, rather than intrinsic or communal value. Because of the content, this discourse was named as a profit-oriented farmer's discourse. Participant 16 strongly exemplifies this discourse (Fig. 3A-C), and as the following quotation shows, he saw TRBs as expendable:

TRB management may work for others. Personally, I don't have motivation for it. It is, in my opinion, a waste of time. I do not see our TRB as valuable anymore, because it has transformed into a forest. During time [ten years] *it has changed completely. (Participant 16, male non-manager)*

His comment describes how land use and corresponding vegetation dynamics determine the identity of the TRB site. When management ceases, the process of overgrowing starts, and eventually the TRB site loses its original function and is taken into commercial forestry. Because land-use functions form the basis of farm production, profit-oriented farmer's discourse sees the farm landscape as dynamic: it adapts to the prevailing livelihood. Later during the interview participant 16 described the process of TRB abandonment in more detail, exemplifying how ecological and social processes are tied to each other:

Our TRB had been a pasture for decades, and when the cattle grazed there, it looked fine. The vegetation was neatly eaten: no willows, no bushes, nothing. My parents got excited about the payment, but then came the restrictions on pasturing… In practice, it was impossible to prevent cows from moving between the TRB and fertilized pastures, or regulate their numbers. Then we gave up dairy production, and grazing ended. During the rest of the contract period we cleared the bushes by hand, but it was hard work, and the payment was low. (Participant 16, male non-manager)

The discourse further highlighted several obstacles to promoting TRB management. Lack of grazing animals and presumed low quality of TRB fodder were mentioned as practical reasons, but also increasing bureaucracy involved in AES payments and farmers' fear of AES inspection were seen as contributing to TRB abandonment. These factors and the above account reveal how TRB management has become separated from farming practices, a process which cannot be reverted by current – often unappealing – AES measures. Functional separation between TRB management and contemporary farming, in turn, resulted from agricultural modernization, which essentially works against TRB management:

TRBs are the losers in this game. Agriculture centers in more productive regions and aims for higher yields and TRBs are not competitive in that sense. (Participant 19, male manager)

In essence, this landowner is identifying what many feel: TRBs cannot compete, financially, with newer intensive farming and commercial forestry practices that dominate the landscape. Thus, if it is a matter of maintaining livelihoods, the AES payments are not enough to support the continuation of TRB management.

4.2.3 Landscape manager's discourse

570
571 The third discourse reflects an alternative farm-level approach to TRBs: it focused on the
572 opportunities of farmers to foster traditional rural landscapes. This discourse connected to the
573 conservationist discourse (correlation coefficient between these two factors was 0.737) but
574 was more practice-oriented. Statements related to landscape management were ranked higher
575 and those related to biodiversity or cultural heritage were seen less important (Table A.1).
576 With its hands-on approach, the aptly named "landscape manager's discourse" adopted
577 another utilitarian perspective towards TRBs.
578
579 Within farms, TRBs were seen as parts of pasture rotation together with fertilized pastures.
580 Wood-pastures also contributed to farms' forest cover even if they were excluded from
581 silvicultural purposes; they needed to be cleared of bushes, and provided wood from selective
582 logging. Because of this upscaling through management practices, TRBs were not perceived
583 as separate sites but as parts of a larger functional entity: the farm or surrounding landscape.
584
585 Landscape manager's discourse emphasized that TRB management is dependent on modern
586 agricultural practices, especially livestock rearing. It highlighted the importance of grazers,
587 pasture rotation, and transferring grazing animals between farms (i.e. situations where
588 livestock farms pastured grazing animals on another landowner's TRB site). Although
589 landscape manager's discourse shares the interest in cattle farming with the profit-oriented
590 farmer's discourse, it contrasts the latter by criticizing agricultural intensification:
591
592 *Finnish farmers are idealizing intensive production and big units; they say that small-scale*
593 *production is not profitable. But it is more complex than that. In reality small farms often get*
594 *on better than large ones. (Participant 3, male manager)*
595
596 *Things are going far worse because farms specialize in their production. We try to be more*
597 *self-sufficient. Nowadays, because farms get larger, farmers can keep only few kinds of*
598 *domestic animals, if any. We are going to an opposite direction. (Participant 4, female*
599 *manager)*
600
601 The above comments refer to vulnerability of large farms to economic volatility. Both
602 landowners state that by farming in a multifunctional, small-scale manner they are able to
603 control for this unsecurity. Participant 4 contributed strongly to the landscape manager's
604 discourse (Fig. 3B). She and five other managers said they had incorporated TRB
605 management efficiently into an environmentally sustainable livelihood. For them, AES
606 payments were encouraging taking larger areas into TRB management:
607
608 *With payments I am able to manage several TRBs, not only the one near my house. The*
609 *payment is not a motive, but it makes things possible. The payment motivates me to expand*
610 *TRB management, but it is not the reason why I manage TRBs. (Participant 15, male*
611 *manager)*
612

His passage exemplifies how conservationist's and landscape manager's discourses can be integrated; the former may provide the underlying motivation for TRB management and the latter reflects the practical context enabling the management actions. In contrast with the profit-oriented farmer's discourse, which criticized the bureaucracy involved in the AES, landscape manager's discourse adopted a positive attitude towards AES contracts.

4.2.4 Landscape admirer's discourse

Contributors to the fourth discourse expressed a general admiration of rural landscapes with a detachment from modern cattle husbandry. Landscape admirer's discourse did not focus on management of TRBs *per se*, but rather on maintaining the aesthetics of open sceneries, thus reflecting a broader landscape level approach. This is exemplified in a quote from participant 7, who contributed notably to the discourse (Fig. 3C):

Open landscape is beautiful. […] If management ceases, it doesn't take long before bushes and trees start to grow. Landscape needs to be managed. (Participant 7, male non-manager)

The will to maintain open scenery was expressed also in other discourses, but whereas those underlined the importance of agricultural management, the fourth discourse questioned its environmental benefits. It especially criticized modern animal husbandry, which became clear when discussing whether grazing on lake and river shores should be permitted. This issue aroused strong opinions among some landowners. If they had experienced that shore grazing deteriorated water quality, they deemed it a generally poor practice:

They have a large cattle farm, and the animals are allowed to graze along the shore [on a fertilized pasture]. And the cows defecate into the lake. I think it doesn't improve the shore. I would say it's the same for TRB pastures. (Participant 14, female manager)

Participant 7 gave a very similar account from his neighborhood. Importantly, the shore grazing dispute exemplifies how landscape admirer's discourse positions itself outside of agricultural production. This is in contrast with the other three discourses, which underlined the positive outcomes of farming for TRB management. Those landowners who agreed most with the landscape admirer's discourse did not have cattle or sheep. Their removal from cattle farming may explain why the discourse adopted a critical approach towards it.

When compared to other discourses, the focus of landscape admirer's discourse is in the past, not in the future. It appreciates traditional sceneries and reproves modern agriculture that reshapes rural landscape. It expresses a concern for the diminishing traditional landscape and points out that industrialized farming has contributed to the deterioration of the rural environment. Although the discourse emphasizes management of rural landscape, it questions the role of farmers as stewards of that landscape, and criticizes the effectiveness of modern practices in maintaining its values. It presents negative outcomes of contemporary farming practices such as grazing, and expresses a need for state intervention and regulations to control farmers' behaviors. Despite this demand for more rigorous governance, landscape

admirer's discourse was the least familiar with the AES, and its contributors expressed a lack of knowledge on the scheme's structure, aims, and measures.

5. Discussion

5.1 The effect of current agri-environmental policies on TRB management

Our main finding is that TRB management fosters a diversity of cultural values and meanings. Although the Finnish AES provides important resources for TRB management, it fails to recognize this multifacetedness of TRB management. This is concerning, because if agri-environmental policies overlook the social context in which management actions actually occur, their regulations may fail to achieve their objectives, or worse, lead to negative side effects (Kaljonen, 2006; Uthes and Matzdorf, 2013). Our study indicates that the current agri-environmental policies do not meet large-scale needs in advancing TRB conservation in Finland. In the following paragraphs we discuss the ineffectivess of current TRB policies in more detail.

The participants of our study pointed out that the Finnish AES marginalizes TRB management into a highly regulated, site-specific special measure, and conceptually detaches it from regular agricultural practices. The main focus of AESs is on mitigation of environmental detriments of industrial agriculture (Batáry et al., 2015; Kleijn and Sutherland, 2003), but at the same time the CAP system as a whole supports economic efficiency, profit maximization, and maximum use of technological inputs (Robinson, 1991). We argue that this situation dismisses social complexities and a multitude of values that are distinctive for landscape management actions such as TRB management. Precise understanding of the complexity of assigning values to landscapes is shown to be important for decision-making on the protection and development of cultural landscapes (Plieninger et al., 2015b), but the AES overlooks this need. It isolates the actions that maintain these valued landscapes from the socioeconomic context that is the basis of their existence; in a sense, it separates the "cultural" from the "agricultural".

The loss of agricultural function makes TRBs vulnerable to abandonment. Our results indicate that this process operates on more than one spatial level. On the farm level TRBs are dependent on land-use decisions of the landowners, and TRB abandonment largely follows from changes in landowners' livelihoods. Such functional characteristics of the TRB system were revealed through discourse analysis. We found out that in social-ecological systems context, discourses provide useful lenses into different ways in which the system's actors perceive and explain the system's structure and behavior. They are able to reveal causal interactions that control the system's outcomes, and thus are potentially responsive for policy interventions. For example, the profit-oriented farmer's discourse speaks on the fact that rural livelihoods are controlled by international and domestic markets and politics; they drive TRB abandonment indirectly through impeding integration of TRB management with farming, or inducing giving up farming. The migration of young people from rural to urban areas due to diminishing livelihood opportunities also contributes to the process. This transformation is

seen not only in the landscapes of Central Finland but throughout the country, as landowners point out. Also throughout Europe, changes in economic conditions for farming drive agricultural land abandonment and land-use intensification (Beilin et al., 2014; Plieninger et al., 2006). Because of the large-scale nature of these drivers, it is not surprising that the AES lacks the means to confront them; instead, it tries to adapt to the current economic conditions, which drive the decline of TRBs.

Despite the socioeconomic pressures, some TRBs persist, because landowners have a will to manage them. Yet what people actually value about TRBs is not supported nor acknowledged by monetary payments. Although the AES covers the site-specific costs of management, landowners rejected the idea that monetary benefits drive TRB management. This supports earlier results in which TRB managers' motivations were largely intrinsic and related to an affection to open landscapes (Birge and Herzon, 2014; Kumm, 2003; Stenseke, 2006). Under the AES, farmers are incentivised to change their behavior for a fixed number of years using money as the main motivator (de Snoo et al., 2013; Kaljonen, 2008), based on the assumption that all people are equally motivated by money to behave in specific ways. We found that TRBs hold a variety of additional values: conservation, utilitarian, aesthetic, and nostalgic. Many of these are tied to rural livelihoods, especially small-scale cattle farming. We argue that these are the factors counteracting TRB loss, rather than the AES contracts.

Certain landowners announced TRB management as their primary livelihood and said that they could handle the bureaucracy of the AES payments as long as TRB management was possible. These managers represent an emerging group of farmers that are able to use the AES in order to establish diversified rural livelihood strategies that build on management of biodiversity and landscape. Birge and Herzon (2014) identified these "TRB entrepreneurs", whose farming strategy is based on TRB grazing; in our study, their chosen livelihood resonates with the landscape manager's discourse. Although TRB entrepreneurs take advantage of the AES, they have to be cautious to not rely completely on the payments. Agri-environmental policies are constantly changing (Batáry et al., 2015), and if TRB management becomes dependent on the amount and continuation of payments, direct links between farmers and their environments erode, leaving TRBs susceptible to abandonment (Kumm, 2003; Sutcliffe et al., 2013). In fact, TRB entrepreneurs said they feel rebellious because their way of life opposes current agri-environmental policies. They have a will to conserve TRBs, but they feel the AES contracts both enable and confine their means to do so. These concerns were reflected in conservationist's discourse, which criticized the effectiveness of the AES in TRB conservation.

Furthermore, the AES falls short in encouraging TRB restoration. Non-managers were generally set against its bureaucracy and the payments did not motivate them to initiate restoration. This finding contributes to earlier studies demonstrating that AESs appeal primarily to farmers already aware of environmental issues (Batáry et al., 2015; Kleijn and Sutherland, 2003; Matzdorf and Lorenz, 2010), and fail to catalyze environmentally-friendly motivation and behavior (de Snoo et al., 2013). Landscape admirer's discourse points out that on the large-scale, contemporary farming practices do not self-evidently promote TRBs. AES

payments may slow the abandonment of traditional grazing farms but be incapable of stopping it (Kumm, 2003). In Finland this most likely relates to the fact that the payments are utilized by a small proportion of all TRB landowners.

We observed that the Finnish AES does not reach all TRB landowners because it is targeted towards active farmers. This results in biased and ineffective governance of TRB conservation on a national level. This deficiency hinders both the utilization of management funding and spread of information on TRBs. As Herzon and Mikk (2007) point out, sufficient demonstration and advisory work are essential to practicing conservation on farmland. Based on our study, the AES currently lacks these. Together with the unprofitability of small-scale cattle farming, overall failure to raise awareness of TRBs and their value seem to contribute to landowner decisions that lead to TRB abandonment.

In sum, the AES oversimplifies TRB management by defining it as an external practice to what is seen as regular farming. The management payments provide resuscitation but are unable to cure the ultimate cause behind TRB loss: detachment from agricultural practices. Conflictually, this implies that the AES strengthens the very phenomenon that drives TRB abandonment. Finnish AES also fails in educating general public on values related to TRBs, encouraging TRB restoration, and providing support for non-farming TRB landowners. Given these shortcomings, we conclude that the Finnish environmental administration should take precautions to account for the risks involved in its reliance on the AES in implementing TRB conservation.

5.2 Insight for developing new effective policies: a resilience approach

Maintaining TRBs for future generations requires managing them in order to enhance their resilience to future changes (Chapin et al., 2009; Olsson et al., 2004; Plieninger and Bieling, 2013). In the previous section we described several factors that reduce the resilience of TRB systems and make them vulnerable for abandonment. In this section, we outline main findings that give insight into developing new resilience-promoting policies.

Advancing TRB management needs new policies that build on the relation between people and landscape (Bürgi et al., 2004; Stenseke, 2006; Stobbelaar and Pedroli, 2011) and reconstruct the "virtuous cycle" (*sensu* Selman and Knight, 2006) that created and maintained the social-ecological system of which TRBs were a part. In practice, this does not mean reproduction of the vernacular landscape, but re-connecting social and economic entrepreneurship with environmental processes and patterns within contemporary contexts (Plieninger and Bieling, 2013; Selman and Knight, 2006).

What is the contemporary virtuous cycle of TRB management? Our results demonstrate that TRB management is tied to a perception of TRBs as nexuses of values related to biodiversity, landscape, and living cultural heritage. Landowners express the positive interactions between TRB management and their way of life, relationship to nature, appreciation of cultural landscape, and perceptions of landownership and continuity. Positive experiences and

ecological effects of management actions strengthen the linkage between landowners and the land owned, thus building landowners' sense of place and landscape identity. These reciprocal connections with the landscape motivate further management. On a wider level, TRB management provides beneficial outcomes also for the general public, and positive feedback from the community acts as a further motivator for management (Herzon and Mikk, 2007; Stenseke, 2006). Reinforcing these positive feedback loops is of particular importance in building social-ecological resilience, as these interrelations are responsible for the stability of the system (Berkes et al., 2003).

Effective policies would support these self-regulating interactions through spreading information on values tied to TRBs, rather than concentrating on monetary incentives, as one of the landowners noted. Here we do not propose discontinuation of AES payments, but their development into a less bureaucratic and more open system. One possibility would be to utilize result-oriented payments, which are directly linked to achieving specific environmental goals (Birge et al., 2017; Matzdorf and Lorenz, 2010). Result-oriented payments facilitate manager motivation, continuity of participation, and flexibility and innovation in management (Matzdorf and Lorenz, 2010). They support better understanding of the environmental goals through managers' self-control (e.g. detecting indicator species; Matzdorf and Lorenz, 2010). The practice of coupling observed biodiversity outcomes to payment level would strengthen the ecological feedback link reflecting effectiveness of TRB management, and would especially correspond to TRB entrepreneurs' way of life. A case study that tested a hypothetical result-oriented payment scheme for environmental grasslands found out that Finnish farmers were generally positive about the approach, but administrative officials were critical towards it, arguing that it could not fit into the current institutionalised programme (Birge et al., 2017). This, however, is not the case for TRB payments. In the current AES 2014–2020, nationally and regionally valuable TRBs are provided with a higher management payment (600 €/ha/year) when compared to sites surveyed as locally valuable (450 €/ha/year) (Ministry of Agriculture and Forestry, 2014). This means that the idea of payment-by-results is already introduced to Finnish AES, although its implementation remains authority-driven.

One of the main criticisms for result-oriented payments is that they may be unsuitable for risk-averse farmers (Matzdorf and Lorenz, 2010). They, and those non-managers who wish to avoid the bureaucracy involved in the AES, might better benefit from a coupled support promoting TRB management. Although the trend has been to cut down such direct payments, European Union member states can allocate a limited share of CAP pillar I funding for securing the continuity of potentially vulnerable production sectors. For example, the current Finnish Rural Development Programme has such a measure for helping young farmers to set up their farm enterprise (Ministry of Agriculture and Forestry, 2014). It could be possible to tailor a respective measure for small-holder farmers with diversified production – a group where TRB managers identify themselves, according to our study. This payment would not be tied to AES, which is paid from CAP pillar II budget. Its main benefit lies in its potential to encourage TRB maintenance and restoration indirectly by supporting farming livelihoods compatible with TRB management.

The two options presented above build on existing policies, for which reason they target only farmers. Increasing land tenure of non-farmers is challenging current TRB conservation (Ministry of Agriculture and Forestry, 2014). This calls for innovation of new governance practices that reach beyond farmers, and support landowners' self-organizing efforts to TRB management. Such opportunities could be mediated through and funded by general rural development measures under CAP pillar II, but they yet need to be planned and tested in practice. This work, and development of possible result-oriented or direct payments, should follow the principles of social learning and flexible governance that contribute to the adaptive capacity of the social-ecological system (Berkes et al., 2003).

Thus knowledge on TRB systems and their best management practices needs to be built, shared, and applied, and this is essentially a collaborative process. We agree with Kaljonen (2008) that the current agri-environmental policies would benefit from increased discussion and co-operation between authorities and different stakeholders. Overall, there is an increasing recognition of the necessity to include the values and priorities of people in any activity of natural or cultural resources conservation (Plieninger et al., 2006). As a mutual will to safeguard TRBs and traditional landscapes emerged from the interviews, we argue that funding and advice for TRB management should be available more widely, easily, and transparently. Landowners need to be enabled to implement their own strategies to maintain TRBs. Such a linkage between people and their environment helps navigate transitions through periods of socioeconomic uncertainty (Berkes et al., 2003).

Concentrating on sources of innovation and renewal is important in enhancing social-ecological resilience (Berkes et al., 2003). We documented a practical example of emerging novel TRB management: through co-operative grazer networks TRB and cattle owners spread grazing animals on TRB sites that would otherwise have been abandoned. Grazer networking enhances TRB resilience in the face of changes in the non-farming landowners' livelihoods as long as cattle husbandry continues within the surrounding landscape. From a policy perspective, grazer networking and similar innovations should be supported more in order to promote TRB pasturage through collaborative efforts. Corresponding measures have also been proposed in Sweden (Kumm, 2003).

Most importantly, the connection between TRB management and rural living needs to be revived through the development of opportunities to support TRB-based livelihoods. As a livelihood, agriculture is connected to markets; as a land-use practice, TRB management has become at least partially about environmental conservation. Thus, the current context has created a mismatch between the historical context in which TRBs formed and how they are currently valued. Contemporary TRB management must adapt to current circumstances in order to persist. In the end, new markets for TRB-based products are needed in order to affect the large-scale socioeconomic drivers of TRB abandonment. These may include organic or regional specialty products, high-quality food, and ecotourism (Plieninger and Bieling, 2013). Creation of such production chains could be based on collaboration between cattle farms, nature conservancy entrepreneurs, and meat-producing enterprises (Kumm, 2003).

A word of caution is required at this point. If social-ecological linkages maintaining land-use systems break apart, landscape functionality and distinctivess are lost (Selman and Knight, 2006). We have shown that TRB management is tied to cattle farming, and rural livelihoods are under constant pressure. At the same time, TRBs are ecologically dynamic, and as managers point out, their biotic qualities respond rapidly to changes in management regimes (realized as alternative land uses). Ecological succession, visible as invasive shrubland or woodland, is the most obvious sign of TRB disappearance. Shortly after abandonment, landowners experienced rapid overgrowth notably for the worse. As one non-manager said, sometimes TRBs do not get noticed until they are abandoned, and after that their value is recognized. This corresponds to Lindborg et al.'s (2008) conclusion that abatement of management actions initiates a process of deterioration in ecological, cultural, social, and economic values alike. However, we noted that the situation changes when the process surpasses a certain threshold. At this phase the site loses its appearance as a TRB and becomes susceptible to alternative land-uses. Crossing such a threshold significantly reduces resilience of the social-ecological system, making it vulnerable for disturbances (Berkes et al., 2003; Plieninger and Bieling, 2013). Finally, if the process continues until the adaptive capacity of the TRB system is lost, the system shifts into an alternative regime.

Our results indicate that this social-ecological conversion is mentally difficult to overcome: e.g., when the site turns into a forest, landowners become increasingly reluctant to restore it as a TRB. Thus social value and the very identity of a TRB site are bound to its biotic qualities and the remnants of past land-use. Therefore landowners' motivation to reinitiate TRB management depends on time since abandonment and rate of vegetational change. Often the process is slow and may go unnoticed (Bürgi et al., 2004), but non-managers' descriptions on TRB abandonment indicate how abrupt changes may result in a loss of sense of place and a decline in landowners' identification with the landscape. This is an example on how the formerly virtuous cycle becomes a vicious cycle, and there appears to be no spontaneous mechanism whereby this process can be reversed; thus, a public intervention appears necessary if TRBs are indeed a national priority (Selman and Knight, 2006).

Based on these findings, we propose that promoting existing TRB management and advancing TRB restoration are of utmost importance and need rapid proactive and reactive actions. The Finnish environmental and agricultural administrations need to join their forces and take a leading role in developing more flexible and collaborative governance for TRB conservation.

5.3 Conclusion: counteracting the loss of farmland biodiversity and cultural heritage

Thus far TRB conservation as a governance practice has focused excessively either on the AES payments or the ecological qualities of TRB sites, leaving the diversity of social-ecological interactions underrated. Because current policies do not take the social-ecological complexity of the whole TRB system into account, they are unable to sustain TRBs in the long term. Strong reliance on authority-driven payments makes TRB management vulnerable

for changes in agri-environmental policies. The current system conceptually detaches TRB management from regular farming practices, further reducing the resilience of TRB systems.

We suggest that it is time to make a transition from top-down control to promoting actor-oriented approaches to TRB management. We derived discourses on TRB management that can guide and facilitate development of more effective policies, and the key social-ecological features presented suggest starting points for this work. According to our results, landowners perceive TRBs as nexuses of biodiversity and several ecosystem services, a view that could form the basis for new policies. It is essential that the AES is complemented with more resilient and participatory governance. Building such governance requires a shift of focus to the versatile benefits of TRB management and its ability to adapt to modern cattle farming practices. It also calls for increasing collaboration between authorities, local actors, and rural communities. To encourage sustainable TRB management, spreading information on experienced value of TRBs and advice on management is important. New funding opportunities are needed for non-farmers, who manage TRBs for recreation. Supporting TRB entrepreneurship, promoting grazer networks, facilitating collaborative management, and sharing knowledge should be the main foci of effective TRB governance.

Acknowledgments

This work was supported by Maj and Tor Nessling Foundation, Kone Foundation, University of Jyväskylä Science Council, and the Academy of Finland (project no. 275329). The authors wish to thank Eeva Primmer from Finnish Environment Institute and Kristiina Nyholm from Haapalahti farm & University of Jyväskylä for inspiring discussions concerning this work.

References

Aakkula, J., Leppänen, J., 2014. Maatalouden ympäristötuen vaikuttavuuden seurantatutkimus (MYTVAS 3) – Loppuraportti. In Finnish with English summary. Ministry of Agriculture and Forestry. 265 pp.

Adger, W.N., 2000. Social and ecological resilience: are they related? Prog. Hum. Geogr. 24, 347–364. doi:10.1191/030913200701540465

Armsworth, P.R., Acs, S., Dallimer, M., Gaston, K.J., Hanley, N., Wilson, P., 2012. The cost of policy simplification in conservation incentive programs. Ecol. Lett. 15, 406–14. doi:10.1111/j.1461-0248.2012.01747.x

Barry, J., Proops, J., 1999. Seeking sustainability discourses with Q methodology. Ecol. Econ. 28, 337–345.

Batáry, P., Dicks, L. V., Kleijn, D., Sutherland, W.J., 2015. The role of agri-environment schemes in conservation and environmental management. Conserv. Biol. 29, 1006–1016. doi:10.1111/cobi.12536

Beilin, R., Lindborg, R., Stenseke, M., Pereira, H.M., Llausàs, A., Slätmo, E., Cerqueira, Y., Navarro, L., Rodrigues, P., Reichelt, N., Munro, N., Queiroz, C., 2014. Analysing how drivers of agricultural land abandonment affect biodiversity and cultural landscapes using case studies from Scandinavia, Iberia and Oceania. Land use policy 36, 60–72. doi:10.1016/j.landusepol.2013.07.003

Benitez-Capistros, F., Hugé, J., Dahdouh-Guebas, F., Koedam, N., 2016. Exploring

967 conservation discourses in the Galapagos Islands: A case study of the Galapagos giant
968 tortoises. Ambio 45, 706–724. doi:10.1007/s13280-016-0774-9
969 Bennett, N.J., 2016. Using perceptions as evidence to improve conservation and
970 environmental management. Conserv. Biol. 30, 582–592. doi:10.1111/cobi.12681
971 Benton, T.G., Vickery, J.A., Wilson, J.D., 2003. Farmland biodiversity: is habitat
972 heterogeneity the key? Trends Ecol. Evol. 18, 182–188. doi:10.1016/S0169-
973 5347(03)00011-9
974 Berkes, F., Colding, J., Folke, C., 2003. Navigating Social-Ecological Systems: Building
975 Resilience for Complexity and Change. Cambridge University Press, Cambridge, United
976 Kingdom. 393 pp.
977 Birge, T., Fred, M., 2011. New ideas for old landscapes: using a social-ecological approach
978 for conservation of traditional rural biotopes – a case study from Finland. Eur. Countrys.
979 3, 133–152. doi:10.2478/v10091-011-0008-x
980 Birge, T., Herzon, I., 2014. Motivations and experiences in managing rare semi-natural
981 biotopes: A case from Finland. Land use policy 41, 128–137.
982 doi:10.1016/j.landusepol.2014.05.004
983 Birge, T., Toivonen, M., Kaljonen, M., Herzon, I., 2017. Probing the grounds: Developing a
984 payment-by-results agri-environment scheme in Finland. Land use policy 61, 302–315.
985 doi:10.1016/j.landusepol.2016.11.028
986 Bürgi, M., Hersperger, A.M., Schneeberger, N., 2004. Driving forces of landscape change –
987 current and new directions. Landsc. Ecol. 19, 857–868.
988 Cash, D.W., Adger, W.N., Berkes, F., Garden, P., Lebel, L., Olsson, P., Pritchard, L., Young,
989 O., 2006. Scale and cross-scale dynamics: Governance and information in a multilevel
990 world. Ecol. Soc. 11, 8.
991 Chapin, F.S.I., Kofinas, G.P., Folke, C., 2009. Principles of Ecosystem Stewardship. Springer
992 New York, New York, NY, United States of America. 401 pp. doi:10.1007/978-0-387-
993 73033-2
994 Clark, J.R.A., Jones, A., Potter, C.A., Lobley, M., 1997. Conceptualising the evolution of the
995 European Union's agri-environment policy: a discourse approach. Environ. Plan. A 29,
996 1869–1885.
997 Creswell, J.W., 2009. Research Design: Qualitative, Quantitative, and Mixed Methods
998 Approaches, 3rd ed. SAGE Publications, Los Angeles, California, United States of
999 America. 260 pp.
1000 de Snoo, G.R., Herzon, I., Staats, H., Burton, R.J.F., Schindler, S., van Dijk, J., Lokhorst,
1001 A.M., Bullock, J.M., Lobley, M., Wrbka, T., Schwarz, G., Musters, C.J.M., 2013.
1002 Toward effective nature conservation on farmland: Making farmers matter. Conserv.
1003 Lett. 6, 66–72. doi:10.1111/j.1755-263X.2012.00296.x
1004 Elo, S., Kyngäs, H., 2008. The qualitative content analysis process. J. Adv. Nurs. 62, 107–
1005 115. doi:10.1111/j.1365-2648.2007.04569.x
1006 Grönroos, J., Hietala-Koivu, R., Kuussaari, M., Laitinen, P., Lankoski, J., Lemola, R.,
1007 Miettinen, A., Perälä, P., Puustinen, M., Schulman, A., Salo, T., Siimes, K., Turtola, E.,
1008 2007. Analyysi maatalouden ympäristötukijärjestelmästä 2000-2006. In Finnish.
1009 Helsinki, Finland. 168 pp.
1010 Halada, L., Evans, D., Romão, C., Petersen, J.-E., 2011. Which habitats of European
1011 importance depend on agricultural practices? Biodivers. Conserv. 20, 2365–2378.
1012 doi:10.1007/s10531-011-9989-z
1013 Hartel, T., Plieninger, T., 2014. European Wood-pastures in Transition: A Social-Ecological
1014 Approach. Routledge, New York, NY, United States of America. 322 pp.
1015 Heikkinen, I., 2007. Luonnon puolesta – ihmisen hyväksi. In Finnish. Ministry of the
1016 Environment, Helsinki, Finland. 162 pp.

1017 Herzon, I., Mikk, M., 2007. Farmers' perceptions of biodiversity and their willingness to
1018 enhance it through agri-environment schemes: A comparative study from Estonia and
1019 Finland. J. Nat. Conserv. 15, 10–25. doi:10.1016/j.jnc.2006.08.001
1020 Holling, C.S., 1973. Resilience and stability of ecological systems. Annu. Rev. Ecol. Syst. 4,
1021 1–23.
1022 Howard, P., Thompson, I., Waterton, E., 2013. The Routledge Companion to Landscape
1023 Studies. Routledge Taylor & Francis Group, London and New York. 508 pp.
1024 Hugé, J., Waas, T., Dahdouh-Guebas, F., Koedam, N., Block, T., 2013. A discourse-
1025 analytical perspective on sustainability assessment: interpreting sustainable development
1026 in practice. Sustain. Sci. 8, 187–198. doi:10.1007/s11625-012-0184-2
1027 Kaljonen, M., 2008. Bringing back the lost biotopes: the practice of regional biodiversity
1028 management planning in Finland. J. Environ. Policy Plan. 10, 113–132.
1029 doi:10.1080/15239080801928394
1030 Kaljonen, M., 2006. Co-construction of agency and environmental management. The case of
1031 agri-environmental policy implementation at Finnish farms. J. Rural Stud. 22, 205–216.
1032 doi:10.1016/j.jrurstud.2005.08.010
1033 Kleijn, D., Sutherland, W.J., 2003. How effective are European agri-environment schemes in
1034 conserving and promoting biodiversity? J. Appl. Ecol. 40, 947–969. doi:10.1111/j.1365-
1035 2664.2003.00868.x
1036 Kumm, K.-I., 2003. Sustainable management of Swedish seminatural pastures with high
1037 species diversity. J. Nat. Conserv. 11, 117–125.
1038 Kuussaari, M., Tiainen, J., Helenius, J., Hietala-Koivu, R., Heliölä, J., 2004. Maatalouden
1039 ympäristötuen merkitys luonnon monimuotoisuudelle ja maisemalle: MYTVAS-
1040 seurantatutkimus 2000–2003. In Finnish with English abstract. Finnish Environment
1041 Institute, Vammala, Finland. 212 pp.
1042 Lindborg, R., Bengtsson, J., Berg, Å., Cousins, S.A.O., Eriksson, O., Gustafsson, T., Hasund,
1043 K.P., Lenoir, L., Pihlgren, A., Sjödin, E., Stenseke, M., 2008. A landscape perspective
1044 on conservation of semi-natural grasslands. Agric. Ecosyst. Environ. 125, 213–222.
1045 doi:10.1016/j.agee.2008.01.006
1046 Loupa Ramos, I., Bernardo, F., Carvalho Ribeiro, S., Van Eetvelde, V., 2016. Landscape
1047 identity: Implications for policy making. Land use policy 53, 36–43.
1048 doi:10.1016/j.landusepol.2015.01.030
1049 Matzdorf, B., Lorenz, J., 2010. How cost-effective are result-oriented agri-environmental
1050 measures?—An empirical analysis in Germany. Land use policy 27, 535–544.
1051 doi:10.1016/j.landusepol.2009.07.011
1052 McGinnis, M.D., Ostrom, E., 2014. Social-ecological system framework: Initial changes and
1053 continuing challenges. Ecol. Soc. 19, 30. doi:10.5751/ES-06387-190230
1054 Ministry of Agriculture and Forestry, 2014. Rural Development Programme for Mainland
1055 Finland 2014-2020. 838 pp.
1056 Ministry of the Environment, 1992. Maisemanhoito; Maisema-aluetyöryhmän mietintö I. In
1057 Finnish with English summary. Ministry of the Environment, Helsinki, Finland. 199 pp.
1058 Mládková, P., Mládek, J., Hejduk, S., Hejcman, M., Cruz, P., Jouany, C., Pakeman, R.J.,
1059 2015. High nature value grasslands have the capacity to cope with nutrient
1060 impoverishment induced by mowing and livestock grazing. J. Appl. Ecol. 52, 1073–
1061 1081. doi:10.1111/1365-2664.12464
1062 Morris, C., 2006. Negotiating the boundary between state-led and farmer approaches to
1063 knowing nature: An analysis of UK agri-environment schemes. Geoforum 37, 113–127.
1064 doi:10.1016/j.geoforum.2005.01.003
1065 Olsson, P., Folke, C., Berkes, F., 2004. Adaptive comanagement for building resilience in
1066 social-ecological systems. Environ. Manage. 34, 75–90. doi:10.1007/s00267-003-0101-7

1067 Ostrom, E., 2009. A general framework for analyzing sustainability of social-ecological
1068 systems. Science 325, 419–422. doi:10.1126/science.1172133
1069 Ostrom, E., 2007. A diagnostic approach for going beyond panaceas. Proc. Natl. Acad. Sci.
1070 104, 15181–15187. doi:10.1073/pnas.0702288104
1071 Pelosi, C., Goulard, M., Balent, G., 2010. The spatial scale mismatch between ecological
1072 processes and agricultural management: Do difficulties come from underlying
1073 theoretical frameworks? Agric. Ecosyst. Environ. 139, 455–462.
1074 doi:10.1016/j.agee.2010.09.004
1075 Plieninger, T., Bieling, C., 2013. Resilience-based perspectives to guiding high-nature-value
1076 farmland through socioeconomic change. Ecol. Soc. 18, 20. doi:10.5751/ES-05877-
1077 180420
1078 Plieninger, T., Hartel, T., Martín-López, B., Beaufoy, G., Bergmeier, E., Kirby, K., Montero,
1079 M.J., Moreno, G., Oteros-Rozas, E., Van Uytvanck, J., 2015a. Wood-pastures of
1080 Europe: Geographic coverage, social–ecological values, conservation management, and
1081 policy implications. Biol. Conserv. 190, 70–79. doi:10.1016/j.biocon.2015.05.014
1082 Plieninger, T., Höchtl, F., Spek, T., 2006. Traditional land-use and nature conservation in
1083 European rural landscapes. Environ. Sci. Policy 9, 317–321.
1084 doi:10.1016/j.envsci.2006.03.001
1085 Plieninger, T., Kizos, T., Bieling, C., Le Dû-Blayo, L., Budniok, M.-A., Bürgi, M., Crumley,
1086 C.L., Girod, G., Howard, P., Kolen, J., Kuemmerle, T., Milcinski, G., Palang, H.,
1087 Trommler, K., Verburg, P.H., 2015b. Exploring ecosystem-change and society through a
1088 landscape lens: recent progress in European landscape research. Ecol. Soc. 20, 5.
1089 doi:10.5751/ES-07443-200205
1090 Plieninger, T., van der Horst, D., Schleyer, C., Bieling, C., 2014. Sustaining ecosystem
1091 services in cultural landscapes. Ecol. Soc. 19, 59. doi:10.5751/ES-06159-190259
1092 Prager, K., Reed, M., Scott, A., 2012. Encouraging collaboration for the provision of
1093 ecosystem services at a landscape scale – Rethinking agri-environmental payments.
1094 Land use policy 29, 244–249. doi:10.1016/j.landusepol.2011.06.012
1095 Pykälä, J., 2000. Mitigating human effects on European biodiversity through traditional
1096 animal husbandry. Conserv. Biol. 14, 705–712. doi:10.1046/j.1523-1739.2000.99119.x
1097 Pykälä, J., Alanen, A., Vainio, M., Leivo, A., 1994. Perinnemaisemien inventointiohjeet. In
1098 Finnish. Helsinki, Finland. 106 pp.
1099 Raatikainen, K.J., 2012. Laiduntarinoita: Härkää sarvista -hankkeen loppujulkaisu. In
1100 Finnish. ELY Centre for Central Finland, Jyväskylä, Finland. 56 pp.
1101 Raatikainen, K.J., Mussaari, M., Raatikainen, K.M., Halme, P., 2017. Systematic targeting of
1102 management actions as a tool to enhance conservation of traditional rural biotopes. Biol.
1103 Conserv. 207, 90–99. doi:10.1016/j.biocon.2017.01.019
1104 Raunio, A., Schulman, A., Kontula, T., 2008. Suomen luontotyyppien uhanalaisuus. Osat 1 ja
1105 2. In Finnish with English summary. Finnish Environment Institute, Helsinki, Finland.
1106 264 + 572 pp.
1107 Resilience Alliance, 2017. Resilience Alliance - Key Concepts [WWW Document]. URL
1108 http://www.resalliance.org/key-concepts (accessed 5.2.17).
1109 Robbins, P., Krueger, R., 2000. Beyond Bias? The Promise and Limits of Q Method in
1110 Human Geography. Prof. Geogr. 52, 636–648.
1111 Robinson, G.M., 2005. Stewardship, “proper” Farming and Environmental Gain: Contrasting
1112 Experiences of Agri-environment Schemes in Canada and the EU, in: Essex, S.J., Gilg,
1113 A.W., Yarwood, R.B., Smithers, J., Wilson, R. (Eds.), Rural Change and Sustainability.
1114 Agriculture, the Environment and Communities. CABI Publishing, Wallingford, pp.
1115 135–150.
1116 Robinson, G.M., 1991. EC agricultural policy and the environment: Land use implications in

the UK. Land use policy 8, 95–107. doi:10.1016/0264-8377(91)90002-Z
Selman, P., Knight, M., 2006. On the nature of virtuous change in cultural landscapes: Exploring sustainability through qualitative models. Landsc. Res. 31, 295–307. doi:10.1080/01426390600783517
Soininen, A.M., 1974. Vanha maataloutemme: Maatalous ja maatalousväestö Suomessa perinnäisen maatalouden loppukaudella 1720-luvulta 1870-luvulle. In Finnish with English summary. Suomen historiallinen seura, Helsinki, Finland. 459 pp.
Stenseke, M., 2006. Biodiversity and the local context: linking seminatural grasslands and their future use to social aspects. Environ. Sci. Policy 9, 350–359. doi:10.1016/j.envsci.2006.01.007
Stephenson, W., 1935. Technique of factor analysis. Nature 136, 297–297. doi:10.1038/136297b0
Stobbelaar, D.J., Pedroli, B., 2011. Perspectives on landscape identity: a conceptual challenge. Landsc. Res. 36, 321–339. doi:10.1080/01426397.2011.564860
Sutcliffe, L., Paulini, I., Jones, G., Marggraf, R., Page, N., 2013. Pastoral commons use in Romania and the role of the Common Agricultural Policy. Int. J. Commons 7, 58–72.
Uthes, S., Matzdorf, B., 2013. Studies on agri-environmental measures: A survey of the literature. Environ. Manage. 51, 251–266. doi:10.1007/s00267-012-9959-6
Webler, T., Danielson, S., Tuler, S., 2009. Using Q Method to Reveal Social Perspectives in Environmental Research. Social and Environmental Research Institute, Greenfield, MA, United States of America. 54 pp.

Figure captions

Fig. 1. Location of study sites (A–N) and their surrounding landscape structure. Letters refer to individual traditional rural biotope sites. Circular maps show physical landscape features around sites within a 1 km radius. TRB delineations made by authorities are drawn with black line (data from Centre for Economic Development, Transport and the Environment for Central Finland, abbreviated as ELY Centre for Central Finland). Land cover classes are derived from national CORINE Land Cover 2006 database (© Finnish Environment Institute, under CC BY 4.0 license). For full-color version, the reader is referred to the electronic version of the article.

Fig. 2. Incorporation of interview results into social-ecological system framework (adapted from McGinnis and Ostrom, 2014). Main system components are shown in the top-left panel as abbreviations: S = social, economic, and political settings, RU = resource units, RS = resource system, A = actors, GS = governance system, I = interactions, O = outcomes, ECO = related ecosystems. Large panel represents respective key social-ecological features in relation to decision-making on TRB management or abandonment, derived from the landowner interviews. Features perceived important by both managers and non-managers are in bold face. Additional important features mentioned by either managers or non-managers are indicated with (m) and (n), respectively. Detailed insights of the features are provided in the text. Colored circles (depicted in grey in printed version) correspond to four discourses identified through Q-analysis, which reflect the values contributing to TRB management decision-making and practices. The location and extent of the circles is approximate, but they represent how different points of view put more emphasis on different social-ecological features. “ELY Centre” refers to the regional administrative organization governing implementation of agri-environmental measures in Central Finland.

Fig. 3. Paired comparisons of discourse loadings (i.e. the level of agreement) of landowners according to Q analysis. Profit-oriented farmer’s discourse was chosen as a reference, because it was the least correlated with other discourses (correlation coefficients were 0.152, 0.240, and 0.231 for conservationist’s, landscape manager’s, and landscape admirer’s discourse, respectively). Dashed lines mark zero values. Symbols correspond to landowner groups: circles are managers, squares are non-managers, open symbols are males and filled symbols females. Numbers refer to landowners’ ID codes (see Table 1).

Table 1. Characteristics of the participating landowners. For those not living on the TRB farm, "residence" refers to whether they live in a rural or urban location, or both. "Highest education" level ranges from 1 = primary school to high school, 2 = professional training, 3 = lower degree in polytechnic or university, 4 = higher degree in polytechnic or university. "Subsidy familiarity" refers specifically to TRB management subsidies. "TRB status" is defined according to TRB management practices (grazing or mowing); abandoned sites are typically used for silviculture. Note that some TRB sites are not managed by their landowners.

ID	Gender	Age	Residence	Highest Education	Active farmer	TRB manager	Subsidy familiarity	TRB status
1	female	62	Farm	4	yes	yes	received	managed
2	female	58	Farm	2	yes	yes	knows	managed
3	male	67	Farm	1	yes	yes	received	managed
4	female	23	Farm	3	yes	yes	knows	managed
5	male	24	Farm	2	yes	yes	knows	managed
6	female	62	Farm	2	yes	yes	knows	managed
7	male	80	Farm	1	no	no	unfamiliar	abandoned
8	female	53	Urban	2	no	yes	unfamiliar	managed
9	female	52	Rural & urban	1	no	no	received	abandoned
10	male	55	Rural & urban	1	no	no	received	abandoned
11	male	69	Farm	1	yes	yes	received	managed
12	male	35	Farm	2	yes	no	knows	abandoned
13	female	60	Farm	2	no	yes	received	managed
14	female	56	Farm	3	yes	yes	received	managed
15	male	46	Farm	4	no	yes	received	managed
16	male	46	Farm	2	yes	no	received	abandoned
17	female	42	Urban	4	yes	no	knows	managed
18	female	38	Urban	3	yes	no	knows	managed
19	male	44	Urban	4	yes	yes	knows	managed
20	male	75	Farm	2	yes	yes	received	managed

1185 **Table 2.** Emergent perceptions on TRBs, TRB management, and AES subsidies. The number
1186 (N) and ID codes of landowners contributing to a given perception are presented separately
1187 for managers and non-managers.

	Managers:		Non-managers:	
Landowners' perceptions	N	Landowner IDs	N	Landowner IDs
Managed TRBs are intrinsically valuable.	13	All	7	All
TRBs hold utilitarian value, and contemporary land-use practices link TRB management to every-day farming.	7	1, 2, 3, 4, 5, 13, 15	1	16
TRB site is an undistinguishable part of nature and farm's domains.	11	1, 2, 3, 4, 5, 8, 11, 13, 14, 15, 20	2	7, 16
The surrounding local landscape, including the TRB, facilitates a sense of belonging.	11	1, 2, 3, 4, 5, 6, 13, 14, 15, 19, 20	3	9, 10, 12
TRB management fosters temporal continuity of multiple values within the landscape.	9	1, 2, 3, 4, 8, 11, 13, 15, 19	2	9, 10
Land-use history created by a long chain of generations is alive on managed TRBs.	8	3, 4, 8, 11, 13, 14, 19, 20	2	17, 18
Grazing is crucial for TRB management.	13	All	7	All
Having grazing animals is a way of life and enjoyable.	8	1, 2, 3, 4, 5, 11, 13, 14	0	n/a
TRBs, their management, and TRB subsidies are positive things.	13	All	7	All
TRB management is not driven by money.	13	All	7	All
AES and inspections by ELY Centre bring excess bureaucracy into TRB management.	8	1, 2, 3, 4, 5, 11, 14, 20	5	9, 10, 12, 16, 19
Voluntariness of TRB management is important.	5	4, 6, 13, 14, 15	2	7, 16
All landowners should share same opportunities and possibilities of TRB subsidies.	5	3, 8, 13, 14, 15	5	7, 9, 10, 12, 16

1188
1189

Table 3. Factor characteristics. Factor 1 corresponds to conservationist's discourse, factor 2 to profit-oriented farmer's discourse, factor 3 to landscape manager's discourse, and factor 4 to landscape admirer's discourse. Initial eigenvalue represents the variance accounted for by a specific factor before rotation. The proportion of total variance explained by each factor is given both before and after Varimax rotation. Number of defining Q sorts corresponds to the number of participants whose sorts were utilized in factor rotation. Composite reliability indicates the level to which each factor is explained by its observed variables. Factor scores are created for each observation for each factor and standardized according to a z-score, and their standard error is shown in the last row.

	Factor 1	Factor 2	Factor 3	Factor 4
Initial eigenvalue	8.1448	1.6248	1.1486	1.0641
Total variance explained (%) before rotation	43	9	6	6
Total variance explained (%) after rotation	23	9	18	12
Number of defining Q sorts	11	2	8	4
Composite reliability	0.978	0.889	0.970	0.941
Standard error of factor scores	0.149	0.333	0.174	0.243

Appendix

Table A.1. List of Q statements with factor-wise Z-scores and factor arrays emergent from the Q analysis. Ranks vary between -6…6 with respect to transition from strong disagreement to strong agreement with the statement. For each factor, distinguishing statements – i.e. statements that were ranked significantly differently when compared to other factors – are indicated by their statistical significance (* for P<0.05 and ** for P<0.01). Factor 1 corresponds to conservationist's discourse, factor 2 to profit-oriented farmer's discourse, factor 3 to landscape manager's discourse, and factor 4 to landscape admirer's discourse. "AES" refers to agri-environment scheme.

		Factor 1		Factor 2		Factor 3		Factor 4	
Statement		Z-score	Rank	Z-score	Rank	Z-score	Rank	Z-score	Rank
S1	Traditional rural biotopes are a significant addition to biodiversity.	1.57*	5*	0.12	0	0.80	2	0.95	2
S2	Agriculture significantly contributes to maintaining biodiversity in Finland.	1.04	2	1.59	5	1.04	3	1.46	4
S3	Biodiversity has declined because of changes in agriculture and the intensification of land use.	1.33**	4**	0.30	1	0.62	1	0.44	1
S4	The simplification of agricultural landscape is a bad thing.	1.69	6	0.44	1	1.26	4	0.81	2
S5	Traditional rural biotopes are beautiful.	1.08	3	0.06**	0**	1.29	4	1.50	4
S6	Traditional rural biotopes have special plant species that hard to find elsewhere.	0.95	2	0.26	1	0.96	2	0.66	2
S7	There is a growing appreciation for rural landscapes, which is expected to continue.	0.38	1	0.32	1	0.42	1	1.27*	3*
S8	Every grazed traditional rural biotope is valuable for the rural landscape.	0.64*	2*	-1.93**	-6**	1.14	3	1.31	3
S9	Management of traditional rural biotopes is a separate or useless part of the farm's production.	-2.37	-6	-0.82*	-2*	-2.47	-6	-1.69*	-5*
S10	Management of nature and landscape can support the livelihoods of a farm in many ways.	0.17	0	0.20	0	1.50**	5**	-0.08	0
S11	More of the available money should be directed to finding abandoned traditional rural biotope sites and getting them into management.	-0.96	-4	1.22	4	-0.74	-2	1.15	3
S12	It is difficult to recognize the potential sites for AES payments on a farm.	-0.32	-1	-0.38	-1	-0.93	-3	-0.44	-1
S13	Overgrown vegetation that threatens the openness of landscapes needs to be curtailed.	0.44	1	-0.96	-2	0.49	1	-0.21	0
S14	Decrease in the amount of uncultivated open and semi-open habitats is a major problem.	0.82**	2**	-1.09	-3	-0.39	-1	-0.97	-3
S15	Practice of agriculture is a prerequisite for maintenance of open and managed rural landscape.	0.50**	1**	-1.56	-5	1.49**	5**	-0.86	-2
S16	Transferring animals from other farms to the managed traditional rural biotope for AES payments is artificial.	-1.49	-4	-1.53	-4	-2.17	-5	-0.92	-3
S17	A traditional rural landscape is best maintained by grazing animals.	0.66	2	2.17	6	1.99	6	0.14	0
S18	Management of traditional rural biotopes is important to landscape and overall environment management.	1.30	3	0.12**	0**	1.10	3	1.59	5
S19	A managed area is always better than an unmanaged one.	-0.29**	-1*	1.01	3	0.39	1	1.66	6
S20	Grazing traditional rural biotopes located on shores improve ecological quality of adjacent lakes.	-0.19	0	1.02**	3**	-0.58	-1	-1.88**	-6**
S21	Grazing always increases the species diversity of traditional rural biotopes.	0.30	1	1.02	3	0.44	1	-1.57**	-4**
S22	Fodder from traditional rural biotopes is of lower quality when compared to cultivated pastures.	-0.96	-3	1.53**	4**	-0.61	-1	-0.29	-1
S23	Grazing on traditional rural biotopes is important for animal well-being.	0.38	1	-1.85	-6	0.50	1	-1.81	-6
S24	Management of traditional rural biotopes is getting harder because there are not enough grazing animals.	-0.53	-2	2.11**	6**	-0.57	-1	-0.20	0
S25	Big farms do not graze their animals on traditional rural biotopes.	-0.23	0	-0.06	0	-1.13**	-4**	-0.30	-1
S26	Large predators restrict the opportunities to graze domesticated animals on traditional rural biotopes.	-1.60**	-5**	0.82	2	0.86	2	0.59	1
S27	Management of traditional rural biotopes has not improved enough in Finland.	-0.36	-1	-0.76	-2	-0.39	-1	-0.18	0
S28	European Union's support for industrial agriculture works against management of traditional rural biotopes.	0.45**	1**	-0.62	-1	-1.25	-5	-1.65	-4
S29	Giving grazers extra fodder and access to cultivated pastures negatively affects biodiversity of traditional rural biotopes.	-0.23	0	-0.70	-2	-1.24	-4	-0.66	-2
S30	There are too few traditional rural biotopes and they must all be managed better.	-0.22	0	-0.82	-2	-0.34	0	0.57**	1**
S31	Bureaucracy of the AES payments is increasingly complex.	-0.22	0	1.67**	5**	-0.14	0	0.39	1
S32	Making applications for traditional rural biotope management payments is hard.	-0.74	-2	-0.44	-1	-0.88	-2	-0.95	-3
S33	It takes a long time to get decisions on traditional rural biotope management payments.	-0.42	-1	-0.64	-2	-0.75	-2	-0.62	-1

	Statement	Factor 1 Z-score	Rank	Factor 2 Z-score	Rank	Factor 3 Z-score	Rank	Factor 4 Z-score	Rank
S34	Simplifying the regulations of traditional rural biotope management payments would make them more appealing.	0.26	0	0.38	1	0.68	2	-0.12	0
S35	Traditional rural biotopes are maintained only because of the AES payments.	-2.51	-6	-1.01	-3	-2.39	-6	-1.69	-5
S36	National funding for non-farmers is needed to encourage management of traditional rural biotopes.	0.71	2	1.49*	4*	-0.37*	-1*	0.34	1
S37	Farmers need new incentives in order to maintain traditional rural biotopes and diverse landscapes.	-0.24	-1	1.21	3	0.67	2	-0.17	0
S38	Farmers are afraid to apply for traditional rural biotope management payments because it increases the chance of inspection.	-0.80	-3	0.64**	2**	-0.43	-1	-1.05	-3
S39	Traditional rural biotope management payments should allow for more flexible management.	-0.04	0	0.64	2	0.07	0	-0.20	0
S40	Many farmers are unwilling to pay for counseling on environmental management.	-0.25	-1	0.64*	2*	-0.21	0	-0.22	0
S41	Counseling visits and support are of utmost importance in improving the management of traditional rural biotopes.	0.61	1	-0.00	0	-0.12	0	0.65	2
S42	Many farmers would benefit from counseling on AES payments.	-0.21	0	0.38	1	0.33	0	0.39	1
S43	Farmers cannot manage traditional rural biotopes properly without counseling.	-1.49	-4	-1.02	-3	-0.23	0	0.25	1
S44	Grazing a large traditional rural biotope is profitable for the farm.	-0.21	0	0.32	1	-0.99*	-3*	-0.35	-1
S45	The commodification of landscape and traditional rural biotopes is part of modern agriculture.	-0.49	-1	0.06	0	0.36	0	-0.44	-1
S46	Management of traditional rural biotopes is not profitable even with the AES payment.	-0.70	-2	0.38	1	-0.17	0	-0.61	-1
S47	Money is the main reason farmers engage in environmental protection.	-2.20*	-5*	-1.33	-4	-0.62	-2	-0.22	-1
S48	It is almost impossible to make a durable fence with the traditional rural biotope management payment.	-0.78	-3	-0.50	-1	-0.99	-3	-0.81	-2
S49	Traditional rural biotope management payments do not meet the management and labor costs.	-0.54	-2	-0.44	-1	-0.42	-1	-0.72	-2
S50	Traditional rural biotopes that have national or regional value deserve management payments higher than the current maximum.	0.36	1	-0.20	-1	0.29	0	0.13	0
S51	Through traditional rural biotopes Finns remember their history.	1.32	4	-1.29**	-3**	0.99	3	1.45	4
S52	Cultural landscape created and shaped by agricultural livelihoods is a central part of Finland.	1.35*	4*	0.18	0	0.63	1	2.06*	6*
S53	Besides agricultural production, cultivated landscapes produce intangible benefits.	1.45**	5**	0.12	0	0.82	2	0.61	2
S54	Farmers have to take the responsibility for management of traditional rural biotopes.	-0.88	-3	-1.53	-4	-0.69	-2	-1.36	-4
S55	Quality of traditional rural biotopes is getting worse because authorities do not have resources for working with them.	-0.72	-2	-0.30	-1	-0.96	-3	-0.69	-2
S56	Quality of traditional rural biotope and landscape management should be coordinated nationally.	-0.29	-1	-1.79**	-5**	-0.64	-2	0.38*	1*
S57	Farmers feel that managing for landscape is more important than managing for biodiversity.	-0.60	-2	0.90**	2**	-1.13	-4	-0.79	-2
S58	Managed traditional rural biotopes speak to people. There is something special about them.	1.17	3	-0.38**	-1**	0.62*	1*	1.65	5
S59	Children benefit from traditional rural biotopes, because they bring animals and nature close.	1.32	3	-0.20**	-1**	1.32	4	0.89	2
S60	It is important that traditional rural biotopes are maintained for future generations.	1.80	6	0.82	2	1.86	6	1.40	3

Discourse narratives derived from compiling the sorting statements.

Factor 1. Conservationist's discourse

It is important that future generations get to know TRBs (S60). Children benefit from visiting TRBs, as it brings them closer to animals and nature (S59). TRBs add significantly to biodiversity in Finland (S1), but because of agricultural intensification and alarming simplification of rural landscape this biodiversity has become threatened (S3, S4). This is realized in the decrease of TRBs and other uncultivated open and semi-open habitats (S14). Open and managed rural landscape is central for Finland, and it needs agriculture (S15, S52), which provides not only food, but also intangible benefits related to nature and culture (S53). Grazed TRBs often are valuable for rural landscape (S8), but there should also be sites without management (S19), if they contribute to biodiversity. Predatory animals do not pose a threat for grazing on TRBs (S26); they also belong to nature. Farmers can easily incorporate TRB management into farms' production (S9, S43), but economic purposes are not driving TRB management or agri-environmental protection (S35, S47). Instead, inner conflicts of the AES payment system are possibly working against TRB management, as the AES promotes also industrial agriculture (S28).

Factor 2. Profit-oriented farmer's discourse

Although agriculture contributes significantly to biodiversity (S2), features of rural landscape can be maintained without it (S15). Yet, management of traditional rural landscape is dependent on grazing and livestock production (S17). TRB management is only one part of landscape management and environmental protection (S18), just as animal welfare is not solely tied to grazing on TRBs (S23). All TRBs are not special, beautiful, or otherwise valuable for the rural landscape (S5, S8, S58). There are several reasons why promoting TRB management is hard: lack of grazing animals (S24), increasing bureaucracy involved in AES payments (S31), the fear of AES inspection (S38), and the low quality of TRB fodder (S22). Motivation for TRB management comes from utility value; its incorporation into farm production and landscape management (S9, S57), rather than from national history or environmental education (S51, S59). For example, TRB grazing should be encouraged because it improves the water quality of lakes adjacent to TRB pastures (S20). Advisory services or national coordination for TRB management are of secondary importance (S40, S56). Also non-farming TRB landowners should be able to conduct management and receive funding for it (S36).

Factor 3. Landscape manager's discourse

Continuing practice of agriculture is a prerequisite for maintenance of rural landscape (S15). Management of biodiversity and landscape can support a farm's livelihoods in many ways (S10), and TRB management is tied to farming (S9). Maintaining TRBs for future generations is important (S60), and this work is best done through livestock grazing (S17). Contemporary farming practices and financial support for agricultural intensification are not compromising the biodiversity related to TRBs (S28). Also large farms utilize TRBs as pastures (S25), although grazing on TRBs is rarely profitable for the farm (S44). Lending and borrowing grazing animals for TRB management is a good practice that should be encouraged (S16). AES payments are not the basis for TRB management (S35), and funding for non-farmers is not crucial in encouraging TRB management (S36). Managed TRBs hold some intrinsic value (S58).

Factor 4. Landscape admirer's discourse

Rural landscape created and shaped by agricultural livelihoods is a central part of Finland (S52), and the appreciation for it is growing (S7). Landscape management should be promoted so that the number of abandoned, overgrowing areas would decrease (S19). In general, TRB management is important work for the rural landscape and the environment (S18), and it is not driven by the AES payments (S35). Managed TRBs are something special; they speak to people (S58). TRBs often are a useful part of a farm's production (S9). In reality TRBs are scarce and they need better management (S30); for this reason the quality of TRB and landscape management might benefit from national coordination (S56). Grazing has potential harmful consequences that need to be considered: grazing near lakes or streams should not be encouraged, as it deteriorates the quality of water (S20); and sometimes grazing decreases the species diversity of TRB sites (S21). Furthermore, grazing animals need to be tended well also outside of TRBs (S23).