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

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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*

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## 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

45 farmers' motivations to adopt the schemes. Such information is usually derived from  
46 interviews or surveys targeted to farmers either participating in AESs or not (Uthes and  
47 Matzdorf, 2013). Factors explaining AES uptake include age, likelihood of having a  
48 successor, and sufficiency of financial incentives (Prager et al., 2012; Uthes and Matzdorf,  
49 2013); also ease of management (Morris, 2006), interest in wildlife (Herzon and Mikk, 2007;  
50 Matzdorf and Lorenz, 2010), and a will to maintain landscape aesthetics (Birge and Herzon,  
51 2014) are important motivators. Additionally, these findings could benefit from a holistic  
52 approach that aims to synthesize a range of issues affecting farm-level decision-making.  
53 Furthermore, as studies specifically target farmers, they rarely include other landowners  
54 whose land-use decisions are undeniably important in conserving biodiversity.

55

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

74

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

82

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

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

100

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

114

## 115 **2. Conceptualizing management of traditional rural biotopes as a social-ecological** 116 **system**

117

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

129

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

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

138

139 The resource units derived from TRBs are various. In Finland, TRBs have traditionally been  
140 used to collect fodder for livestock; dung from pastures to fertilize fields; and wood from  
141 wood-pastures (Ministry of the Environment, 1992). Many of these old land-use practices  
142 have nearly vanished. Still, grazed TRBs provide pasture, and the importance of quality meat  
143 production on TRBs is growing (Birge and Herzon, 2014). Across Europe, TRBs also provide  
144 a multitude of non-agricultural ecosystem services such as cultural heritage and scenic beauty  
145 (Birge and Fred, 2011; Birge and Herzon, 2014; Plieninger et al., 2015a; Stenseke, 2006;  
146 Sutcliffe et al., 2013). Yet, the most material benefit to Finnish TRB managers is the  
147 monetary compensation of management costs paid for via national AES (hereafter  
148 “payment”). The AES promotes voluntary environmentally-friendly agriculture by  
149 incentivizing farmers for providing desired environmental benefits, which are regularly  
150 inspected (Armsworth et al., 2012; Kaljonen, 2006). In year 2012, Finnish farmers received a  
151 total of 8.4 million euros of payments for covering costs of TRB management, comprising  
152 2.4% of the total AES expenditure (Aakkula and Leppänen, 2014).

153

154 In Finland, management of TRBs is the single most effective AES measure in terms of  
155 promoting biodiversity (Aakkula and Leppänen, 2014; Grönroos et al., 2007; Kuussaari et al.,  
156 2004). As a consequence, the governance, funding, and advisory services on TRB  
157 management are arranged around the implementation of the national AES.

158

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

170

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

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

178

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

194

195 Although deriving key social-ecological components offers valuable information for policy-  
196 making, Ostrom’s framework’s approach to social-ecological systems is structural, not  
197 interpretive. Therefore complementing it with discourse analysis gives insight into how  
198 people themselves view the system in question. Discourse analysis is able to reveal  
199 underlying patterns or meanings in people’s beliefs and opinions with a focus on verbal  
200 interaction, dialogue, and practices in which these shared meanings are embedded (Creswell,  
201 2009; Hugé et al., 2013; Webler et al., 2009). Thus it provides policy-makers a better  
202 understanding on how to apply the refined social-ecological knowledge.

203

### 204 **3. Material and methods**

205

#### 206 *3.1 Overview on methodology*

207

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

219

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

235

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

240

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

245

### 246 *3.2 Data collection*

247

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

259

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



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

266

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

273

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

276

### 277 *3.3 Content analysis*

278

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

284

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

291

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

296

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

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

310

### 311 *3.4 Q analysis*

312

313 Q-analysis focused on discourses on TRBs and TRB management, reflecting the values and  
314 priorities related to TRBs on a general level (Barry and Proops, 1999; Robbins and Krueger,  
315 2000; Stephenson, 1935). The procedure started with identification of the body of  
316 information about the research topic, following Webler et al. (2009). The main source  
317 materials were published TRB manager interviews (Raatikainen, 2012) and meeting  
318 documents of the Biodiversity and Landscape working group that was called together upon  
319 the preparation the AES 2014–2020 (Ministry of Agriculture and Forestry, 2014). The source  
320 materials were read through and TRB-related assertative quotes were systematically  
321 collected. From this set of 135 initial statements we extracted 60 final statements that  
322 reflected the diversity of opinions around TRB management.

323

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

331

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

340

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

344

## 345 **4. Results**

346

### 347 *4.1 Key social-ecological factors affecting landowners’ motivations for TRB management*

348

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

352

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

363

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

371

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

379

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

387

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

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

397

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

403

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

412

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

420

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

426

#### 427 *4.2 Discourses reflecting emergent meanings tied to TRB management*

428

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

438

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

444

#### 445 *4.2.1 Conservationist's discourse*

446

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

456

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

462

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

466

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

472

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

479

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

482 *territory. Because I know every rock, every spot... it is mine, my home. And by home I really*  
483 *mean the surrounding environment, not only the house. (Participant 15, male manager)*  
484

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

493  
494 *Maybe, if we were offered more information on TRBs, rather than always told to apply for*  
495 *AES payments, we could see the versatile opportunities in TRB management. (Participant 8,*  
496 *female manager)*  
497

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

501  
502 *The AES should move towards paying for provision of ecosystem services. It would bring*  
503 *TRB management to the same line with other production sectors, and farms could specialize*  
504 *in it, in producing biodiversity. (Participant 1, female manager)*  
505

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

#### 517 518 *4.2.2 Profit-oriented farmer's discourse* 519

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

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

530

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

535

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

543

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

551

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

560

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

563

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

568

569 *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 insecurity. 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



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

618

#### 619 *4.2.4 Landscape admirer's discourse*

620

621 Contributors to the fourth discourse expressed a general admiration of rural landscapes with a  
622 detachment from modern cattle husbandry. Landscape admirer's discourse did not focus on  
623 management of TRBs *per se*, but rather on maintaining the aesthetics of open sceneries, thus  
624 reflecting a broader landscape level approach. This is exemplified in a quote from participant  
625 7, who contributed notably to the discourse (Fig. 3C):

626

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

629

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

636

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

640

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

647

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

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

659

## 660 **5. Discussion**

661

### 662 *5.1 The effect of current agri-environmental policies on TRB management*

663

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

673

674 The participants of our study pointed out that the Finnish AES marginalizes TRB  
675 management into a highly regulated, site-specific special measure, and conceptually detaches  
676 it from regular agricultural practices. The main focus of AESs is on mitigation of  
677 environmental detriments of industrial agriculture (Batáry et al., 2015; Kleijn and Sutherland,  
678 2003), but at the same time the CAP system as a whole supports economic efficiency, profit  
679 maximization, and maximum use of technological inputs (Robinson, 1991). We argue that  
680 this situation dismisses social complexities and a multitude of values that are distinctive for  
681 landscape management actions such as TRB management. Precise understanding of the  
682 complexity of assigning values to landscapes is shown to be important for decision-making  
683 on the protection and development of cultural landscapes (Plieninger et al., 2015b), but the  
684 AES overlooks this need. It isolates the actions that maintain these valued landscapes from  
685 the socioeconomic context that is the basis of their existence; in a sense, it separates the  
686 "cultural" from the "agricultural".

687

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

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

707

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

720

721 Certain landowners announced TRB management as their primary livelihood and said that  
722 they could handle the bureaucracy of the AES payments as long as TRB management was  
723 possible. These managers represent an emerging group of farmers that are able to use the  
724 AES in order to establish diversified rural livelihood strategies that build on management of  
725 biodiversity and landscape. Birge and Herzon (2014) identified these "TRB entrepreneurs",  
726 whose farming strategy is based on TRB grazing; in our study, their chosen livelihood  
727 resonates with the landscape manager's discourse. Although TRB entrepreneurs take  
728 advantage of the AES, they have to be cautious to not rely completely on the payments. Agri-  
729 environmental policies are constantly changing (Batáry et al., 2015), and if TRB management  
730 becomes dependent on the amount and continuation of payments, direct links between  
731 farmers and their environments erode, leaving TRBs susceptible to abandonment (Kumm,  
732 2003; Sutcliffe et al., 2013). In fact, TRB entrepreneurs said they feel rebellious because their  
733 way of life opposes current agri-environmental policies. They have a will to conserve TRBs,  
734 but they feel the AES contracts both enable and confine their means to do so. These concerns  
735 were reflected in conservationist's discourse, which criticized the effectiveness of the AES in  
736 TRB conservation.

737

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

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

748

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

757

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

767

## 768 *5.2 Insight for developing new effective policies: a resilience approach*

769

770 Maintaining TRBs for future generations requires managing them in order to enhance their  
771 resilience to future changes (Chapin et al., 2009; Olsson et al., 2004; Plieninger and Bieling,  
772 2013). In the previous section we described several factors that reduce the resilience of TRB  
773 systems and make them vulnerable for abandonment. In this section, we outline main  
774 findings that give insight into developing new resilience-promoting policies.

775

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

783

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

789 ecological effects of management actions strengthen the linkage between landowners and the  
790 land owned, thus building landowners' sense of place and landscape identity. These  
791 reciprocal connections with the landscape motivate further management. On a wider level,  
792 TRB management provides beneficial outcomes also for the general public, and positive  
793 feedback from the community acts as a further motivator for management (Herzon and Mikk,  
794 2007; Stenseke, 2006). Reinforcing these positive feedback loops is of particular importance  
795 in building social-ecological resilience, as these interrelations are responsible for the stability  
796 of the system (Berkes et al., 2003).

797

798 Effective policies would support these self-regulating interactions through spreading  
799 information on values tied to TRBs, rather than concentrating on monetary incentives, as one  
800 of the landowners noted. Here we do not propose discontinuation of AES payments, but their  
801 development into a less bureaucratic and more open system. One possibility would be to  
802 utilize result-oriented payments, which are directly linked to achieving specific  
803 environmental goals (Birge et al., 2017; Matzdorf and Lorenz, 2010). Result-oriented  
804 payments facilitate manager motivation, continuity of participation, and flexibility and  
805 innovation in management (Matzdorf and Lorenz, 2010). They support better understanding  
806 of the environmental goals through managers' self-control (e.g. detecting indicator species;  
807 Matzdorf and Lorenz, 2010). The practice of coupling observed biodiversity outcomes to  
808 payment level would strengthen the ecological feedback link reflecting effectiveness of TRB  
809 management, and would especially correspond to TRB entrepreneurs' way of life. A case  
810 study that tested a hypothetical result-oriented payment scheme for environmental grasslands  
811 found out that Finnish farmers were generally positive about the approach, but administrative  
812 officials were critical towards it, arguing that it could not fit into the current institutionalised  
813 programme (Birge et al., 2017). This, however, is not the case for TRB payments. In the  
814 current AES 2014–2020, nationally and regionally valuable TRBs are provided with a higher  
815 management payment (600 €/ha/year) when compared to sites surveyed as locally valuable  
816 (450 €/ha/year) (Ministry of Agriculture and Forestry, 2014). This means that the idea of  
817 payment-by-results is already introduced to Finnish AES, although its implementation  
818 remains authority-driven.

819

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

833

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

843

844 Thus knowledge on TRB systems and their best management practices needs to be built,  
845 shared, and applied, and this is essentially a collaborative process. We agree with Kaljonen  
846 (2008) that the current agri-environmental policies would benefit from increased discussion  
847 and co-operation between authorities and different stakeholders. Overall, there is an  
848 increasing recognition of the necessity to include the values and priorities of people in any  
849 activity of natural or cultural resources conservation (Plieninger et al., 2006). As a mutual  
850 will to safeguard TRBs and traditional landscapes emerged from the interviews, we argue that  
851 funding and advice for TRB management should be available more widely, easily, and  
852 transparently. Landowners need to be enabled to implement their own strategies to maintain  
853 TRBs. Such a linkage between people and their environment helps navigate transitions  
854 through periods of socioeconomic uncertainty (Berkes et al., 2003).

855

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

865

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

877

878 A word of caution is required at this point. If social-ecological linkages maintaining land-use  
879 systems break apart, landscape functionality and distinctiveness are lost (Selman and Knight,  
880 2006). We have shown that TRB management is tied to cattle farming, and rural livelihoods  
881 are under constant pressure. At the same time, TRBs are ecologically dynamic, and as  
882 managers point out, their biotic qualities respond rapidly to changes in management regimes  
883 (realized as alternative land uses). Ecological succession, visible as invasive shrubland or  
884 woodland, is the most obvious sign of TRB disappearance. Shortly after abandonment,  
885 landowners experienced rapid overgrowth notably for the worse. As one non-manager said,  
886 sometimes TRBs do not get noticed until they are abandoned, and after that their value is  
887 recognized. This corresponds to Lindborg et al.'s (2008) conclusion that abatement of  
888 management actions initiates a process of deterioration in ecological, cultural, social, and  
889 economic values alike. However, we noted that the situation changes when the process  
890 surpasses a certain threshold. At this phase the site loses its appearance as a TRB and  
891 becomes susceptible to alternative land-uses. Crossing such a threshold significantly reduces  
892 resilience of the social-ecological system, making it vulnerable for disturbances (Berkes et  
893 al., 2003; Plieninger and Bieling, 2013). Finally, if the process continues until the adaptive  
894 capacity of the TRB system is lost, the system shifts into an alternative regime.

895

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

907

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

913

### 914 *5.3 Conclusion: counteracting the loss of farmland biodiversity and cultural heritage*

915

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

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

923

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

938

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940

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945

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1138  
1139

1140 Figure captions

1141

1142 **Fig. 1.** Location of study sites (A–N) and their surrounding landscape structure. Letters refer  
1143 to individual traditional rural biotope sites. Circular maps show physical landscape features  
1144 around sites within a 1 km radius. TRB delineations made by authorities are drawn with black  
1145 line (data from Centre for Economic Development, Transport and the Environment for  
1146 Central Finland, abbreviated as ELY Centre for Central Finland). Land cover classes are  
1147 derived from national CORINE Land Cover 2006 database (© Finnish Environment Institute,  
1148 under CC BY 4.0 license). For full-color version, the reader is referred to the electronic  
1149 version of the article.

1150

1151 **Fig. 2.** Incorporation of interview results into social-ecological system framework (adapted  
1152 from McGinnis and Ostrom, 2014). Main system components are shown in the top-left panel  
1153 as abbreviations: S = social, economic, and political settings, RU = resource units, RS =  
1154 resource system, A = actors, GS = governance system, I = interactions, O = outcomes, ECO =  
1155 related ecosystems. Large panel represents respective key social-ecological features in  
1156 relation to decision-making on TRB management or abandonment, derived from the  
1157 landowner interviews. Features perceived important by both managers and non-managers are  
1158 in bold face. Additional important features mentioned by either managers or non-managers  
1159 are indicated with (m) and (n), respectively. Detailed insights of the features are provided in  
1160 the text. Colored circles (depicted in grey in printed version) correspond to four discourses  
1161 identified through Q-analysis, which reflect the values contributing to TRB management  
1162 decision-making and practices. The location and extent of the circles is approximate, but they  
1163 represent how different points of view put more emphasis on different social-ecological  
1164 features. “ELY Centre” refers to the regional administrative organization governing  
1165 implementation of agri-environmental measures in Central Finland.

1166

1167 **Fig. 3.** Paired comparisons of discourse loadings (i.e. the level of agreement) of landowners  
1168 according to Q analysis. Profit-oriented farmer’s discourse was chosen as a reference,  
1169 because it was the least correlated with other discourses (correlation coefficients were 0.152,  
1170 0.240, and 0.231 for conservationist’s, landscape manager’s, and landscape admirer’s  
1171 discourse, respectively). Dashed lines mark zero values. Symbols correspond to landowner  
1172 groups: circles are managers, squares are non-managers, open symbols are males and filled  
1173 symbols females. Numbers refer to landowners’ ID codes (see Table 1).

1174 **Table 1.** Characteristics of the participating landowners. For those not living on the TRB  
 1175 farm, “residence” refers to whether they live in a rural or urban location, or both. “Highest  
 1176 education” level ranges from 1 = primary school to high school, 2 = professional training, 3 =  
 1177 lower degree in polytechnic or university, 4 = higher degree in polytechnic or university.  
 1178 “Subsidy familiarity” refers specifically to TRB management subsidies. “TRB status” is  
 1179 defined according to TRB management practices (grazing or mowing); abandoned sites are  
 1180 typically used for silviculture. Note that some TRB sites are not managed by their  
 1181 landowners.  
 1182

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

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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.

Landowners' perceptions	Managers:		Non-managers:	
	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

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 1189

1190 **Table 3.** Factor characteristics. Factor 1 corresponds to conservationist’s discourse, factor 2  
 1191 to profit-oriented farmer’s discourse, factor 3 to landscape manager’s discourse, and factor 4  
 1192 to landscape admirer’s discourse. Initial eigenvalue represents the variance accounted for by  
 1193 a specific factor before rotation. The proportion of total variance explained by each factor is  
 1194 given both before and after Varimax rotation. Number of defining Q sorts corresponds to the  
 1195 number of participants whose sorts were utilized in factor rotation. Composite reliability  
 1196 indicates the level to which each factor is explained by its observed variables. Factor scores  
 1197 are created for each observation for each factor and standardized according to a z-score, and  
 1198 their standard error is shown in the last row.

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	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

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## 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.

Statement	Factor 1		Factor 2		Factor 3		Factor 4	
	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		Factor 2		Factor 3		Factor 4	
	Z-score	Rank	Z-score	Rank	Z-score	Rank	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).