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# Dimensions of Landscape Stewardship across Europe: Landscape Values, Place Attachment, Awareness, and Personal Responsibility

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**Abstract:** Improved perceptions towards landscape stewardship, at the local level, could help achieve more sustainable futures. However, little research has been done on the dimensions of landscape stewardship underlying such perceptions. Here we look at the perception of landscape values, place attachment, awareness of the adverse consequences human action might have on landscapes, and ascription of personal responsibility across Europe as well as how these dimensions are connected and influenced by personal capabilities and socio-cultural contexts. We conducted a cross-site comparison study, in six European municipalities, using a survey to capture residents' levels of awareness, responsibility, and attachment as derived from a set of statements. Respondents were also asked to indicate the values they perceive in the local landscape from a given list. The data was analysed by combining frequency analysis, factor analysis, and contingency tables. In our sample of 726 respondents, stronger awareness was related to stronger ascription of personal responsibility, but a connection to place attachment was not clear. Perception of multiple landscape values was related to stronger awareness, responsibility, and place attachment. Meanwhile, awareness and responsibility were influenced by respondents' occupation, levels of income and education, and socio-cultural context, whereas place attachment was linked to their relationship to the local area. We conclude that enhancing commitment towards landscape stewardship, at the local level, requires efforts focused on making environmental education more universal, implementing green options accessible to everyone, and people experientially engaging more actively with their local landscapes.

**Keywords:** European cross-site comparison; place-based; local level; multifunctional landscapes; personal capabilities; socio-cultural context; experiential landscape engagement

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## 1. Introduction

### 1.1. A Global Challenge That Requires Local Action

The need to face the ongoing decline of biological and cultural diversity and transgression of planetary boundaries [1,2] is at the core of global science-policy processes (e.g., Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [3], the UN Sustainable Development Goals [4], and the UNESCO-SCBD Programme Linking Biological and Cultural Diversity [5]), where there is now common agreement that radical changes are needed to keep the planet from reaching irreversible environmental thresholds and tipping points. However, global-level policies

have proven to be insufficient for avoiding unsustainable futures [6], and some authors propose that it is actually at the local and regional scales—within which social and natural factors closely interact and “humans meaningfully experience life” [7] (p. 2)—where significant change can happen. At the place-based level, individuals and communities can realise what is needed and their capabilities to take action [8,9], going beyond rhetoric and bureaucratization. Finding out more about what motivates or inhibits people and how action towards sustainability can be triggered thus seems crucial for speeding up the transition to achieve more sustainable futures.

### 1.2. Human–Nature Interaction in Landscapes

Human attitudes and behaviours towards sustainability have been widely studied in the past decades. Bonnes and Lee [10] have analysed environmental psychology theories and defined a starting point for this process in the 1940s, while Kollmuss and Agyeman [11] have reviewed theories and models since the 1960s, and Pires et al. [12] has presented a review of studies dealing with Ecocentrism since the 1970s. However, existing pro-environmental approaches have tended to overlook the socio-cultural aspects involved [13] and are not comprehensive enough to capture the multifaceted dimensions of human interaction with the environment. For this reason, we suggest using a landscape approach, where landscapes are regarded as integrated socio-ecological systems, and humans are viewed as co-creators and not mere users of the environment [14,15], with all the responsibilities this entails. This change of perspective should enable examination of human attitudes and behaviours towards the environment in an integrated manner, considering the diversity of social, ecological, and cultural dimensions in both their biophysical and cognitive forms.

In the present study, we focus on some psychosocial aspects of human–environment interaction that are connected to impulses towards landscape stewardship which have not yet been given enough attention in landscape research, albeit their importance for motivating landscape stewardship commitment has been recognised [16]. We understand such commitment as the willingness of people to take action on multiple landscape functions that they perceive as crucial for their own well-being. Such action can assume several forms and can be taken by both consumers (e.g., consuming local and organic products) or producers (e.g., choosing sustainable land and resources management practices) as well as citizens (e.g., exercising their rights and responsibilities for good governance) or politicians (fostering integrated landscape management; see Scherr [17]).

### 1.3. Dimensions of Landscape Stewardship

Leaving aside deeper psychological components that go beyond the scope of this study (e.g., held values, norms, and beliefs), here we focus on four dimensions that might contribute to commitment towards landscape stewardship: perception of landscape values [18], attachment of people to places [19,20], awareness of the adverse consequences human action can have on landscapes [21,22], and ascription of personal responsibility for maintaining perceived landscape values [23–25].

Appreciation of the multiple functions that landscapes provide for human wellbeing generally lies at the centre of impulses towards landscape stewardship [18]. Such appreciation of, for example, the beauty, cultural heritage, biodiversity, outdoor recreation possibilities, and provisioning of food and other local products associated with local landscapes represents what in the literature is called *assigned values* (i.e., “the perceived qualities of an environment that provide material and nonmaterial benefits to people” [26] (p. 375)) or *landscape values* (i.e., place-based preferences linked to different biophysical and cultural landscape characteristics and elements [27]). Van Riper and Kyle [26] and Seymour et al. [28] have argued that fostering environmental stewardship requires that more attention be paid to these assigned/landscape values as opposed to given, held values (i.e., the “enduring belief that a particular mode of conduct or end-state of existence is personally and socially preferable” [29] (p. 550)), for they are at the core of protective impulses and can help predict behaviour towards the environment. It is often mentioned in the literature how perception of landscape values and associated experiential engagement and connection with place (e.g., outdoor recreation, harvesting, enjoyment of

nature and aesthetics, appreciation of cultural heritage) is linked to sustainable behaviour. Kollmuss and Agyeman [11] highlight the importance of supporting direct experiences with landscapes to influence people's behaviour. For Abson et al. [30], this connection with place is regarded as a leverage point for sustainability transformation, due to its importance for shaping attitudes and behaviours towards landscapes. Ives and Kendal [31] highlight the role of landscape values as key elements in people's involvement in landscape care and decision making. Masterson et al. [16] (p. 54) claims that "place meanings [here captured in the perception of landscape values] underpin individual and collective behaviour in stewardship and in responding to change". Landscape values can be perceived collectively or individually [27], but each person ascribes different meanings to them [16]. Therefore, some authors emphasise the importance of multifunctional landscapes, where different actor groups tend to perceive diverse landscape values. Fisher et al. [32] claim that monofunctional landscapes increase the alienation of people from their local environment, as landscape values there are quite restricted, and only a limited range of actors can benefit from them. Meanwhile, van Ripper and Kyle [26] (p. 381) propose that "the diversity and strength of respondent's value assignments indicated that multiple services [landscape functions] should continue to be provided to the public in an effort to foster stewardship".

*Place attachment*, defined as "the emotional bond between a person and a particular place" [19] (p. 443), is considered a driver of landscape stewardship [15,33]. This emotional bonding can be complemented by functional bonding, resulting from the dependence of people on the functions a landscape provides to their well-being [19,34], and is therefore connected to the specific biophysical and social characteristics of particular places (see natural and social bonding in Raymond et al. [20]). This can generate a relationship of reciprocity between individual perception of landscape values and attachment to a place.

Building on the idea of humans as co-creators of landscapes, the concept of landscape stewardship greatly relies on *ascription of personal responsibility* for sustainable land management and use of natural and socio-cultural resources [23]. Here we emphasise the "personal" component in ascription of responsibility versus a more diffused responsibility, where people expect public authorities or the general society to take action [35]. This sense of responsibility goes beyond mitigation of the adverse consequences of human action on the landscape and entails acknowledgement of one's personal role in preservation of multiple landscape functions, expressed through becoming involved in various practices (e.g., green consumption, sustainable mobility habits, sustainable land management practices, participation in landscape-related decision making). In the environmental psychology literature, the ascription of personal responsibility is often connected to belief in one's own capacity to bring about change (i.e., locus of control in Hawthorne and Alabaster [21]; value, belief, and norm theory in Stern et al. [36]).

Basing ourselves on Schwartz's Norm Activation Model theory [22], we argue that the ascription of responsibility in this domain is motivated by an *awareness of the adverse consequences* human action might have for landscapes. Awareness is not only familiarity with a problem but also implies concern for and understanding of the potential consequences it entails [21]. In the context of landscape stewardship, such awareness of consequences builds upon concerns that human action can put perceived landscape values at risk, if human activity is not attuned to the multifunctionality of the landscape as a whole.

Additionally, many scholars have drawn attention to the importance of *socio-cultural context* and *personal capabilities* for triggering sustainable attitudes and behaviours [37]. Commonly mentioned factors influencing sustainable behaviour include: economic capability [38], level of environmental education [21], and resources and infrastructure provided by institutions and social normative pressure [25]. Other tendencies within the literature also examine the importance of experiential connectedness with place [7], people's relationships with an area [20], and the biophysical qualities of the environment and physical capacities of people [13]. We believe that all these factors play a fundamental role in hindering or fostering landscape stewardship impulses.

#### 1.4. Aim and Research Questions

We consider that there are four important dimensions connected to commitment towards landscape stewardship: perception of landscape values connected to the functions landscape provides to well-being, place attachment, awareness of the adverse consequences human action might have on landscapes, and ascription of personal responsibility for achieving a more sustainable future. These dimensions are, we believe, reinforced or constrained by socio-cultural contexts and personal capabilities. Therefore, in this study we seek to identify patterns indicating how these four dimensions interact with each other and are influenced by personal relationships with an area, personal capabilities, and given social contexts. To this end, we conducted a cross-site comparison study in six areas of Europe, where we asked local residents to share their levels of agreement with a set of statements intended to capture their levels of place attachment, awareness, and personal responsibility. We also asked them to identify the landscape values they perceive in their municipalities. Survey responses were analysed so as to address the following research questions:

- How do respondents across Europe score in terms of place attachment, awareness, and personal responsibility? How are these three dimensions related to each other?
- How is perception of landscape values connected to place attachment, awareness, and personal responsibility?
- How do socio-cultural context, personal capabilities, and respondent relationships with their local areas affect levels of place attachment, awareness, and personal responsibility?
- What are the implications of these results for fostering commitment towards landscape stewardship?

The analysis revealed that higher levels of awareness were connected to higher levels of personal responsibility, but connection to place attachment was not clear. Further, the perception of multiple landscape values was connected to higher levels of place attachment, awareness, and personal responsibility. We found that place attachment increased with years of living in an area as well as having antecedents from there and greater knowledge about it. Finally, we found that awareness and personal responsibility were influenced by the respondents' levels of income and education and by the socio-cultural context.

## 2. Materials and Methods

### 2.1. Study Area

To gather data for this study, we conducted a survey among residents of six European rural or peri-urban municipalities: Colmenar Viejo (Spain), Obersimmental (Switzerland), Börje (Sweden), Peipsiääre and Alatskivi (Estonia), Gera (Greece), and Modbury (UK). Rural and peri-urban landscapes are of special interest in this research as they harbour a wide range of landscape values and meanings and are the perfect arena to analyse the bonds between people and nature. All sites are rural or peri-urban areas but differ in their landscape characteristics (see Table A1 in Garcia-Martin et al. [27] for the general characteristics of the study sites). They were selected to obtain a varied sample in terms of geographic distribution across Europe, socio-economic dynamics (from growing metropolitan areas to alpine villages), and biophysical morphologies (from hilly grasslands to high mountain valleys, drumlin fields, or farmland plains). Bieling and Bürgi [39] provide detailed descriptions of the socio-demographic characteristics of each site. We targeted residents of the municipalities who were older than 14 years. The number of residents that fell within this group varied from 764 to 37,239 in the different sites.

### 2.2. Survey

In preparing the survey, we created a list of statements to capture the positions of the respondents with regard to a series of dimensions that we expected would help to elucidate their levels of

attachment, awareness, and responsibility (Table 1). This list was created by looking at examples of such statements in the literature (for this purpose, we found the Ecoscale of Stone, Barnes and Montgomery [40] and the Scale of Environmental Attitudes Inventory of Milfont and Duckitt [41] particularly useful) and adapting those that were deemed relevant for assessing the levels of attachment, awareness, and responsibility of respondents. The statements used were mainly directed towards product users rather than towards farmers and producers, because we were interested in levels of landscape-stewardship commitment among the former group. We asked all respondents to specify their levels of agreement or disagreement with each statement, using a five-point Likert scale. In order to make what we would call the “correct answer” (i.e., the most environmentally committed one) less obvious and to encourage respondents not to simply select the agree option each time, some of the statements were expressed in reverse order (i.e., statements 2, 3, 4, and 5 in Table 1).

**Table 1.** Statements employed in survey regarding landscape-stewardship commitment.

	<b>Statements To Capture Respondents’ Levels of Place Attachment, Awareness, and Personal Responsibility</b>	<b>Dimensions Captured with the Statement</b>
1.	We need to protect our environment, even if this means that we need to restrict some activities.	Awareness
2.	Landscape should be changed to support human needs, even if this means losing some traditional/historic features.	Awareness
3.	I am not especially interested in being involved in the decisions affecting the landscape of my municipality.	Responsibility
4.	I tend to buy the cheapest products without considering their origin.	Responsibility
5.	I will not change my habits (such as saving water, recycling properly, and not using the car when I can use public transport, walk or cycle) until I see more people doing so.	Responsibility
6.	I feel attached to this place.	Attachment

Next, we asked respondents to identify from a list the landscape values they perceive and appreciate the availability of in their municipalities (e.g., *personal and social fulfilment, appreciation of nature, of localised food production, of outdoor recreation possibilities* (for the complete list see Table A1 in the Appendix A). The list of landscape values was compiled by considering existing typologies in the field: The ecosystem services framework as proposed in the Millennium Ecosystem Assessment [42], a more recent refinement of this basic outline as provided by the Common International Classification of Ecosystem Services CICES Version 4.3 [43], the landscape services concept [44,45], as well as ways in which other researchers have included and adapted these categories within their research [27,46]. To make the concept of landscape values more accessible to respondents, we transposed the list of landscape values into a list of feelings and actions (e.g., *I appreciate, produce or can buy farm products here / I harvest fruits, berries, flowers, mushrooms, asparagus, fish, game etc. / I practise outdoor sports, walking, hiking, biking, dog walking etc.*). The content of the surveys was first created in English and then translated into the relevant local languages by local coordinators of the surveying campaign.

Surveys were conducted on site, using an online platform called Maptionnaire [47]. All surveys were performed with the help of facilitators previously trained by the coordinator of the survey campaign in an effort to assure consistency in the surveying method and avoid strong bias. The introduction to the survey was kept brief and simple to avoid biasing and intimidating the respondent. Respondents were approached randomly, one-by-one on streets, market squares, cafeterias, paths, and other commonly visited places. To limit a possible exclusion of certain segments of the population, a well-distributed location of the recruitment sites was pursued, and surveys were also carried out during weekends. The other recruitment criterion was to achieve a balance in gender and age (as reflected by the local demographic structure). The survey campaign was designed to achieve a representative sample; however, the effectiveness of the measures is ultimately affected by the specific context of each study site and by the strategy followed by each facilitator.

### 2.3. Analysis

We interviewed 870 residents in total and, after cleaning the database, retained 726 for analysis, with the number of respondents per study site being 257 in Colmenar Viejo (35% of the total), 142 in Gera (20%), 138 in Peipsiääre and Alatskivi (19%), 80 in Obersimmental (11%), 72 in Modbury (10%), and 37 in Börje (5%). We performed frequency analysis of respondents' socio-demographic background variables to characterise the sample (see Table A2 and Figure A1 in the Appendix A).

To derive levels of attachment, awareness, and responsibility expressed through the survey responses, we grouped the statements (Table 1) and calculated their mean values. For the statements that were expressed in reverse form (2, 3, 4, and 5 in Table 1), we inverted the scores. Respondents were assigned their correspondent level of attachment, awareness, and responsibility (very high, high, medium, low, very low). To see which dimensions (attachment, awareness, responsibility) scored higher among the respondents (research question 1a), we performed frequency analyses and, to study the relationship between the dimensions (research question 1b), we also performed bivariate correlations by applying Spearman's rank correlation coefficient.

We then created contingency tables to analyse relationships between levels of attachment, awareness, and responsibility and perception of landscape values (research question 2). Perception of landscape values was transformed into a binary variable, where 0 = landscape value not perceived and 1 = landscape value perceived by the respondent. A Chi square test of association was used to reveal statistically significant relationships.

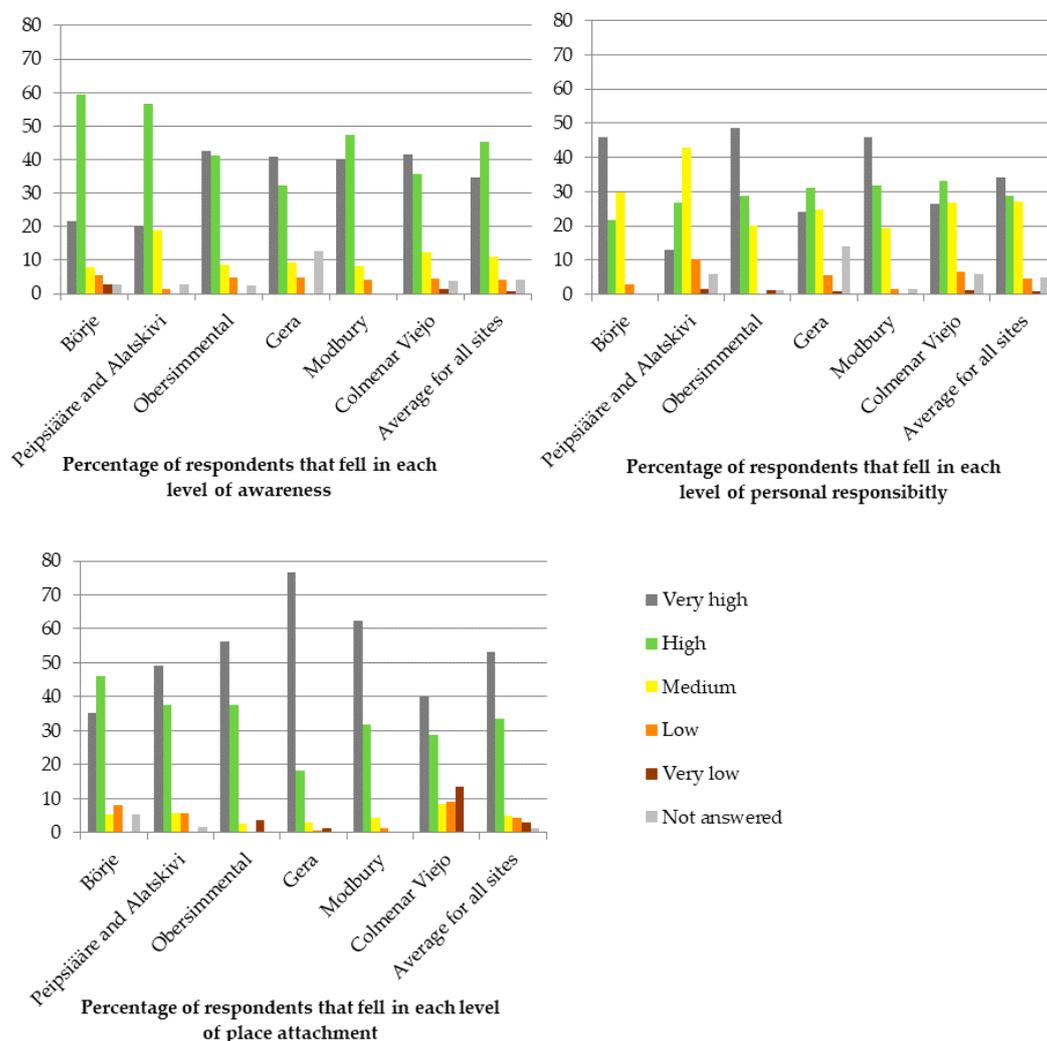
To identify underlying patterns in the data with regard to combination of levels of attachment, awareness, and responsibility and the socio-demographic characteristics of the respondents (research question 3), we carried out factor analysis using principal component analysis as the extraction method and a polychoric correlation coefficient. Cronbach's alpha was applied to test the internal consistency within value measures, and varimax rotation helped us to find the best fit between the variables and the factors. Observations with not-answered questions were removed, and all variables were transformed into numerical variables for the analysis (Table A3 in the Appendix A), which was performed for the whole sample and then study site by study site to identify differences between the European contexts.

## 3. Results

### 3.1. Levels of Place Attachment, Awareness, and Ascription of Personal Responsibility (Frequency-Analysis Results)

Respondents from all study sites exhibited high or very high levels of place attachment, especially in Lesvos (77% having very high levels), followed by Modbury (63%) and Obersimmental (56%) (Figure 1). Most respondents in most study sites exhibited high or very high levels of awareness regarding consequences of landscape alteration (80% of the respondents in the average for all sites), though this was generally higher in relation to nature preservation than to cultural heritage protection (Figure A2 in Appendix A). Meanwhile, levels of responsibility varied among study sites. Obersimmental, Börje, and Modbury presented the highest percentages of respondents exhibiting very high levels of responsibility (46 to 49% of the respondents), whereas Peipsiääre and Alatskivi had the lowest (13%). The three statements that are related to the level of responsibility indicated different levels of agreement among respondents (see Figure A3 in Appendix A). The statement *I will not change my [unsustainable] habits until I see more people doing so* generated the strongest levels of disagreement in all sites, though in Peipsiääre and Alatskivi the percentage of respondents that strongly disagreed (15%) was much lower than the average (36%). The statement *I am not especially interested in taking part in the decisions that affect the landscape of my municipality* generated the highest percentages of respondents that disagreed or strongly disagreed in Modbury, Börje, and Obersimmental (all above 60%). The statement *I tend to buy the cheapest products without considering their origin* resulted in the

greatest differences between study sites, with Börje and Obersimmental showing by far the highest percentages of strong disagreement.



**Figure 1.** Percentage of respondents that fell in each level of place attachment, awareness, and personal responsibility in each study site.

3.2. Relationship between the Levels of Place Attachment, Awareness, and Ascription of Personal Responsibility (Bivariate Correlation Analysis Results)

The correlation coefficient was the highest between awareness and responsibility (Table 2), showing moderate relationships in most sites (except in Obersimmental and Peipsiääre and Alatskivi where the correlation coefficient was weak) (see Table A4 in Appendix A).

**Table 2.** Spearman’s rank correlation coefficient between levels of place attachment, awareness, and personal responsibility (correlation coefficients are strong when  $\geq 0.5$ , moderate when from  $\geq 0.3$  to  $< 0.5$ , and weak when  $< 0.3$  [48]. \*  $P < 0.05$  \*\*  $P < 0.01$  \*\*\*  $P < 0.001$ ).

All Study Sites Together (n = 660)	Awareness	Responsibility
Awareness	1	
Responsibility	0.345 ***	1
Attachment	0.083 *	0.146 ***

The correlation analysis between the statements (reversed statements with inverted scores) presented a moderate correlation coefficient between *I feel attached to this place* and the statement *I am not especially interested in being involved in the decisions affecting the landscape of my municipality*. This correlation was moderate in Modbury and Börje, and weak in Colmenar Viejo (see Table A5 in Appendix A).

### 3.3. Landscape Values and Their Connection with the Levels of Place Attachment, Awareness, and Ascription of Personal Responsibility (Contingency Tables Results)

We found higher levels of awareness in respondents that perceived values in the landscape connected to personal fulfilment ( $p \leq 0.001$ ) and existence ( $p \leq 0.05$ ) (Table 3). Higher levels of responsibility were connected to perception of values linked to personal fulfilment ( $p \leq 0.001$ ), existence ( $p \leq 0.001$ ), cultural heritage ( $p \leq 0.01$ ), and outdoor recreation ( $p \leq 0.01$ ). This was also the case with the appreciation of values connected to regulating ecosystem services ( $p \leq 0.05$ ), nature ( $p \leq 0.05$ ), harvesting possibilities ( $p \leq 0.05$ ), and landscape beauty ( $p \leq 0.05$ ). Meanwhile, higher levels of attachment were connected to appreciation of cultural heritage ( $p \leq 0.001$ ), beauty ( $p \leq 0.001$ ), possibilities for social fulfilment ( $p \leq 0.001$ ), harvesting possibilities ( $p \leq 0.001$ ), and existence ( $p \leq 0.01$ ).

**Table 3.** Statistically significant relationships between awareness, personal responsibility, and place attachment and perception of landscape values, where perception of a landscape value is always related to a higher level of awareness, responsibility, or attachment (for more detailed information, see Table A6 in the Appendix A). *P* values represented as: \*  $P \leq 0.05$ , \*\*  $P \leq 0.01$ , \*\*\*  $P \leq 0.001$ .

X <sup>2</sup> Value (df 5) All Study Sites Together ( <i>n</i> = 726)	Levels of Awareness	Levels of Responsibility	Levels of Attachment
Personal fulfilment	20.87 ***	37.37 ***	
Appreciation of existence of landscape	12.62 *	28.78 ***	14.84 **
Social fulfilment			20.77 ***
Appreciation of cultural heritage		16.85 **	22.29 ***
Appreciation of beauty		11.59 *	22.08 ***
Appreciation of regulating ecosystem services		13.43 *	
Appreciation of nature		13.33 *	
Appreciation of localised food production			
Appreciation of harvesting possibilities		12.62 *	30.54 ***
Appreciation of outdoor recreation possibilities		15.98 **	

### 3.4. Underlying Patterns from Combination of the Socio-Demographic Characteristics of Respondents and Their Levels of Place Attachment, Awareness, and Ascription of Personal Responsibility (Factor-Analysis Results)

The factor analysis for all study sites together revealed well-defined patterns of relationships from combination of levels of attachment, awareness, and responsibility with respondents' socio-demographic background variables (age, education, occupation, income, knowledge of area, years living in area, antecedents from area, land owned in area: see first column in Table 4), with two factors explaining 45% of the variance. One factor brought together attachment and the socio-demographic variables that are connected to the respondent's relation to the area (knowledge of area, years living in area, antecedents from area, land owned in area) (Cronbach's alpha 0.731), whereas the other factor combined awareness and responsibility with the variables of education, income levels (Cronbach's alpha 0.591), and occupation (when included in the analysis, Cronbach's alpha 0.563, see Table A7 in the Appendix A).

The frequency analysis revealed some differences between the Northwest European sites (Modbury, Börje, and Obersimmental), the Estonian one, and the Mediterranean ones; therefore, we repeated the factor analysis for these groups of study sites (Table 4). The same pattern was identified, with two factors explaining 41% of the variance in the Northwest European sites, 49% in the Mediterranean sites, and 43% in the Estonian site. In the Estonian case, the variable land ownership

was linked to the factors of responsibility and awareness, unlike in the rest of the sites. When only the active population was included in the analysis, we found a negative association between the variables occupation, level of education, and level of income combined with the variable of attachment in the Northwest European sites (see Table A7 in the Appendix A; for results of the analysis conducted study site by study site, see Table A8 in the Appendix A).

**Table 4.** Results of factor analysis combining levels of place attachment, awareness, and personal responsibility with socio-demographic background variables. Factor loadings of a principal components analysis with varimax rotation for 10 items. Factor loadings < 0.3 were discarded.

Factor pattern	All Study Sites ( <i>n</i> = 559)		Northwest European Sites ( <i>n</i> = 155)		Mediterranean Sites ( <i>n</i> = 296)		Peipsiääre and Alatskivi ( <i>n</i> = 108)	
	F1	F2	F1	F2	F1	F2	F1	F2
Age	0.387		0.404		0.385			
Education		0.660		0.684		0.667		0.730
Income		0.616	−0.347	0.563		0.528		0.491
Knows area	0.711		0.680		0.719		0.822	
Years living in area	0.709		0.701		0.684		0.714	
Antecedents in area	0.738		0.698		0.818		0.676	−0.335
Land ownership	0.646		0.495	0.346	0.779			0.498
Awareness		0.602		0.497		0.725		0.512
Responsibility		0.762		0.714		0.713	−0.320	0.691
Attachment	0.686		0.505		0.748		0.710	
Eigenvalue	2.686	1.847	2.420	1.663	3.097	1.790	2.534	1.850
Variability (%)	26.862	18.472	24.197	16.626	30.967	17.902	25.337	18.495
Cumulative %	26.862	45.334	24.197	40.823	30.967	48.869	25.337	43.832
Cronbach's alpha	0.729	0.591	0.649	0.510	0.786	0.581	0.630	0.556

#### 4. Discussion

The present study seeks to contribute to the existing research on how commitment towards landscape stewardship can be enhanced, by looking at some dimensions of human–environment interaction at a place-based level. From our literature review, we identified four main dimensions to investigate: perception of landscape values, place attachment, awareness of the adverse consequences human action might have on landscapes, and ascription of personal responsibility. In a cross-site comparison study we looked at different levels of attachment, awareness, and responsibility in six rural and peri-urban areas in Europe and how these levels may be connected to perception of landscape values. We also looked at how attachment, awareness, and responsibility are influenced by socio-cultural context, personal capabilities, and personal relationships with an area. The outcomes of this analysis are presented below. Our results may inform policy, management, educational, and awareness-raising strategies that seek to enhance commitment towards landscape stewardship among local populations.

##### 4.1. A Shared Concern for the Environment and the Unarticulated Importance of Cultural Heritage

In all of the geographical contexts studied, respondents exhibited very high levels of awareness about and concern for the environment, but concern for preservation of cultural heritage did not seem nearly as strong. This could be seen as revealing shared agreement among respondents that human progress should be attuned to safeguarding the environmental values of places but not necessarily their cultural values. However, in a previous study analysing the places where these same respondents located the greatest amount of landscape values [27], we found that cultural heritage played a very important role and that the percentage of respondents perceiving values connected to culture in their local landscape was slightly higher than those associated with nature (see García-Martín et al. [27]). To us, this highlights the importance of landscape hermeneutics, which proposes that to ascribe meaning to cultural experiences this meaning has to be articulated [49,50]. There is a strong and

commonly accepted narrative worldwide about the need to preserve nature and biodiversity from the threats that human action subjects them to—now heightened by the immediacy of climate change. Meanwhile, cultural-heritage narratives are generally focused on recreation and tourism revenues, but its importance for building sense of place and belonging for communities and being a source of mutual understanding and local traditional ecological knowledge do not appear to be so well understood [49]. Another reason might be a lower degree of consciousness about the threats that the ongoing dynamics might pose for the preservation of cultural heritage. We also found differences between study sites which might be connected to different narratives about the roles that cultural heritage plays in societal well-being.

A possible methodological bias to take into account here is that more spatially explicit statements could have reduced the difference between levels of concern towards nature and cultural heritage as, in abstract terms, cultural heritage may not be considered so worthwhile protecting whereas, at a spatially specific level, it may be seen as supporting fundamental meanings and landscape values.

#### 4.2. From Awareness to Ascription of Personal Responsibility: the Role of Personal Capabilities and Socio-Cultural Context

The positive correlation that we found between levels of awareness and responsibility agree with psychosocial models—namely, the Norm Activation Model [22] and the Belief, Norm and Value theory [36,37]—that use these concepts in combination to explain mechanisms that can lead to pro-environmental behaviours. However, in our sample the very high levels of awareness were not consistent with the more moderate levels of responsibility found. A methodological consideration here is that the statements connected to awareness were expressed in more abstract terms (the focus is on humanity) than those connected to responsibility (the focus is on the self), which is likely to make the first group of statements easier to strongly agree with, as the respondent is not confronted with the “specifics of the environmental action” [38] (p. 102).

Well-studied reasons for limited ascription of personal responsibility include barriers posed by structural constraints and personal capabilities [37,38]. Our results show that higher levels of responsibility appear to be associated with higher levels of income, education, and qualification. These findings are in line with other studies that highlight the importance of economic capabilities [38] and education [11,21] to explain individual behaviour.

We take the different levels of responsibility among the study sites as evidence of structural constraints connected to the specific socio-cultural contexts. Based on this assumption, we suggest that the higher levels of disagreement with the statement *I am not especially interested in taking part in decisions that affect the landscape of my municipality* in the Northwest European sites (i.e., Modbury, Börje, and Obersimmental) are connected to higher levels of trust in existing institutions, governance structures, and society overall as well as in respondents’ personal capacities to make appropriate decisions than in the Estonian and Mediterranean cases. The same applies to responses to the statement *I tend to buy the cheapest products without considering their origin*, as disagreement here was also stronger in the Northwest European sites, where higher income levels, better access to green products [11,25], and stronger social pressure [38,51] make the intention to buy local and organic products more likely. Respondents in Gera also showed very high levels of disagreement with this statement, however, which might be explained by a good traditional network for local product distribution and a particularly strong emotional place attachment there. The socio-cultural context might also be the reason why landownership in the Northwest European and Estonian sites was mainly connected to higher levels of responsibility, whereas in the Mediterranean sites it was more connected to higher levels of place attachment. However, these are all conjectures that need to be further studied taking into account the particularities of each site.

Also linked to socio-cultural structural constraints, we believe, the Estonian site exhibited the lowest levels of responsibility and was the site with the lowest percentage of respondents that strongly disagreed with the statement *I will not change my (unsustainable) habits until I see more people doing*

so. This could be linked to its communist past, as some authors claim that in collectivistic cultures, as opposed to individualistic ones, individuals show lower levels of perceived behavioural control and, therefore, their attitudes towards the environment are less likely to turn into an “intention to behave environmentally” [38] (p. 102). This can also be connected to the concept of diffused responsibility, where individuals transfer their personal responsibility to society in general [35].

#### *4.3. The Contested Role of Place Attachment and the Importance of Universalism*

From the results of our study, the role of place attachment for enhancing commitment towards landscape stewardship remains unclear, especially as our correlation analysis did not indicate significant linkages between this dimension and those of awareness and responsibility. However, place attachment did appear to be significantly associated with willingness to be involved in decisions that affect the local landscape (at least in three of the six study sites: Modbury, Börje, and Colmenar Viejo), which is the only statement that was explicitly linked to respondents’ area of residence. In hindsight, we now consider that this lack of evidence regarding a connection between place attachment and the other dimensions might have been due to methodological bias, caused by our lack of more spatially explicit statements representing the dimensions of awareness and responsibility. Nonetheless, beyond this possible methodological bias, and even though place attachment is generally considered to have a positive influence on pro-environmental behaviours (e.g., Halpenny [52], Kaltenborn [53], Walker and Ryan [54]), some authors have queried this connection. Lewicka [55], for example, has provided a list of studies where place attachment did not necessarily appear to contribute towards sustainable behaviours and Masterson et al. [16] have reviewed the role of place attachment in sustainability sciences, highlighting that it is not necessarily attachment to a place what makes people engage in sustainable behaviours but rather the meanings that they assign to the place.

In all of the geographic contexts investigated, levels of attachment were higher among respondents who had been living longer in the targeted areas, had antecedents from the area, and knew it better. This is in line with the findings of Raymond et al. [20] (p. 425), who highlighted the role of “past action and experience in place” for attachment and identity building. However, this sector of the sample population did not necessarily exhibit the highest levels of awareness or responsibility. In fact, in the Northwest European sites, respondents with higher levels of education, income, and qualification exhibited lower levels of place attachment but higher levels of awareness and responsibility. A possible explanation here is that people with higher incomes and educational levels have a greater capacity to move geographically and, therefore, have a lower level of dependence on a specific place [55]. These findings are in line with the results from Lewicka [55], who contrasted the role of place attachment versus the role of education for civic activity, with the latter being a more reliable predictor of sustainable behaviour. Among the group of respondents where attachment is not so relevant but the levels of awareness and responsibility are high, the capacity to adapt and a better education where universalism values are thought -i.e., “understanding, appreciation, tolerance, and protection for the welfare of all people and for nature” [56] (p. 2) might be behind the disposition to change one’s own behaviour for the common well-being [57].

#### *4.4. Perception of Landscape Values and its Connection to Place Attachment, Awareness, and Personal Responsibility*

Our contingency tables indicate that levels of attachment, awareness, and responsibility increase with perception of landscape values, underscoring how experiential engagement with the landscape [11,30] and ascription of meaning to one’s local place [16] can contribute to commitment towards landscape stewardship [15].

Landscape values connected to dimensions of a place that require experiential knowledge of it, such as harvesting possibilities and regulating ecosystem services, were connected to higher levels of responsibility, in line with Dorninger et al. [7]. In a previous study [27], we found that appreciation of harvesting possibilities seems to be linked to having antecedents in the area. Combination of

these findings indicates the importance of oral transmission (e.g., regarding harvesting practices) and experiential knowledge for ascription of personal responsibility, as especially the latter helps people understand how their actions might impact the landscape and, therefore, tends to bridge the gap between environmental concern and actual commitment towards the preservation of perceived landscape values [28,58].

Perception of landscape values connected to culture, social interaction, and aesthetics was associated with stronger attachment and responsibility among respondents. In a previous study [27], we observed how such values tend to be perceived collectively and are shared among different local actors. These shared values tend to facilitate mutual understanding and cooperation, becoming especially relevant for landscape stewardship, as it greatly relies on collaboration and communication within a local community for land management activities [59]. Yet, values that are perceived more individually, such as appreciation of a landscape's existence or gaining personal fulfilment from it, also seem to play an important role, as they were strongly associated with higher levels of awareness and responsibility in our study.

#### 4.5. Implications for Landscape Stewardship Enhancement in Europe

To conclude this research, we present a series of general recommendations to foster landscape stewardship in Europe derived from the results of this study and the literature. To improve landscape stewardship, the particularities of each place need to be carefully considered and the recommendations adapted accordingly.

Based on the premise that respondents who experientially engage with their local landscape in different ways tend to also exhibit higher levels of place attachment, awareness, and personal responsibility, we propose the following measures derived from the literature:

- Land management should aim for multifunctional landscapes, where a broad spectrum of actors can engage and connect with a variety of landscape values [32]. Public participation could enable the distinguishing of a diversity of functions that landscapes can provide, and how they are valued by different actors, in order to inform land management and landscape stewardship engagement strategies [26].
- Experiential engagement with landscapes should be fostered by, for example, making them more accessible, taking school classes outdoors—direct learning from nature enhances sustainable attitudes and behaviours according to Duerden and Witt [60]—and providing opportunities for engaging in voluntary landscape-care activities.
- Local knowledge regarding how landscape values can be maintained (e.g., how to collect mushrooms or preserve dry-stone walls) and what kinds of actions might damage them needs to be contested, preserved, and made accessible to subsequent generations. Local knowledge can provide sources of information derived from centuries of direct contact with and adaptive learning from nature.
- Considering that levels of responsibility appear to be connected to an individual's level of education and income and to the overall socio-cultural context, the following measures stemming from our current study may help foster commitment towards landscape stewardship:
- Environmental and civic education need to be accessible to everybody (from grade school to university). The potential impact of education and social classes on pro-environmental behaviour was already known in the 1980s [61,62]; yet, almost four decades later, environmental education has still not been made universal.
- Affordable landscape-stewardship commitment options should be offered to all income levels and socio-cultural contexts. Middlemiss [25] uses the concept of environmental justice to highlight how structural constraints affect the ability of individuals to act on feelings of personal responsibility, and that these structural barriers could be lifted by competent institutions. In the same way that we could argue that everyone has a responsibility to act towards preserving multiple landscape

functions, we could also agree that there must be a right for each person to have the capacity to behave in a way that preserves the landscape values upon which their well-being rests.

It is commonly agreed that place attachment contributes towards landscape stewardship commitment. However, while we do not necessarily think place attachment is required for landscape stewardship, we do think that place meaning [16] and universal values such as tolerance, societal concern, and protecting nature (following Schwartz [63]) need to be reinforced to counteract possible alienation from local environments and communities in current and future generations. Therefore, to foster landscape stewardship such values should be instilled during the early stages of education. Promoting universal values that can lead to awareness and personal responsibility requires concrete knowledge and action strategies to achieve abstract and global sustainability goals [21].

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**Author Contributions:** María García-Martín, Tobias Plieninger, and Claudia Bieling contributed to the conception and design of the study. María García-Martín analyzed the data and drafted the article. Tobias Plieninger and Claudia Bieling revised the article critically for important intellectual content.

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## Appendix A

**Table A1.** List of landscape values and associated actions and feelings presented in the survey.

Landscape Value	Translation into Landscape Actions and Feelings (as Presented in the Survey)
Appreciation of nature, biodiversity, wildlife	I appreciate the plants, animals, ecosystems etc.
Appreciation of localised food production	I appreciate, produce or can buy farm products here
Appreciation of harvesting possibilities	I harvest fruits, berries, flowers, mushrooms, asparagus, fish, game etc.
Appreciation of regulating ecosystem services: Climate, water, soil	I appreciate the environmental capacity to produce, preserve, clean, and renew air, soil, and/or water
Appreciation of outdoor recreation	I practise outdoor sports, walking, hiking, biking, dog walking etc.
Aesthetic values, scenery	I enjoy seeing this beautiful landscape or landmark
Appreciation of the cultural heritage, history, local memory	I appreciate the local culture, cultural heritage or history
Sense of place, local identity, personal fulfilment	I am inspired by feelings, new thoughts, religious or spiritual meanings etc.
Social well-being, social fulfilment	I spend time together with other people
Existential/Altruistic values	I appreciate this place just for its existence regardless of benefits for me or others

Source: García-Martín et al. [27].



**Table A3.** Variables used in frequency analysis, as collected from the survey and then transformed for the analysis.

<b>Variables Connected to Respondent's Socio-Demographic Background</b>								
<b>Age</b>		<b>Highest Level of Education</b>		<b>Economic Sector of Occupation *</b>		<b>Level of Income (Monthly Household Net Income)</b>		
15–19	0.25	no formal education	0.25	primary	0.25	Below average		0
20–29	0.5	school	0.5	secondary	0.5	Above average		1
30–59	0.75	vocational training	0.75	tertiary	0.75			
60–95	1	university	1	quaternary	1			
<b>Variables Connected to Respondent's Relation to the Area</b>								
<b>Years Living in the Area</b>		<b>Knows the Area</b>		<b>Antecedents from the Area</b>		<b>Land Ownership in the Area</b>		
less than 1	0.25	extremely poorly	0.2	No	0	No		0
1 to 5	0.5	quite poorly	0.4	Yes	1	Yes		1
6 to 10	0.75	to some extent	0.6					
more than 10	1	quite well	0.8					
		extremely well	1					
<b>Levels of Place Attachment, Awareness, and Personal Responsibility</b>								
very low	0							
low	0.25							
medium	0.5							
high	0.75							
very high	1							

\* For consistency in transformation of the variable "occupation" into numerical form, we only included respondents that had an occupation at the time of the survey and did not included responses such as "student", "retired" or "unemployed". Therefore, factor analysis was performed twice for each study site, once including the variable occupation, but only with respondents who were active, and once with the whole sample, but without the occupation variable.

In terms of gender and age, the sample was balanced, with the groups of adult men being slightly underrepresented in the Swiss, Estonian, Swedish and British cases, older women slightly underrepresented in the Greek case, and younger women slightly underrepresented in the Swedish case and overrepresented in the Spanish one.

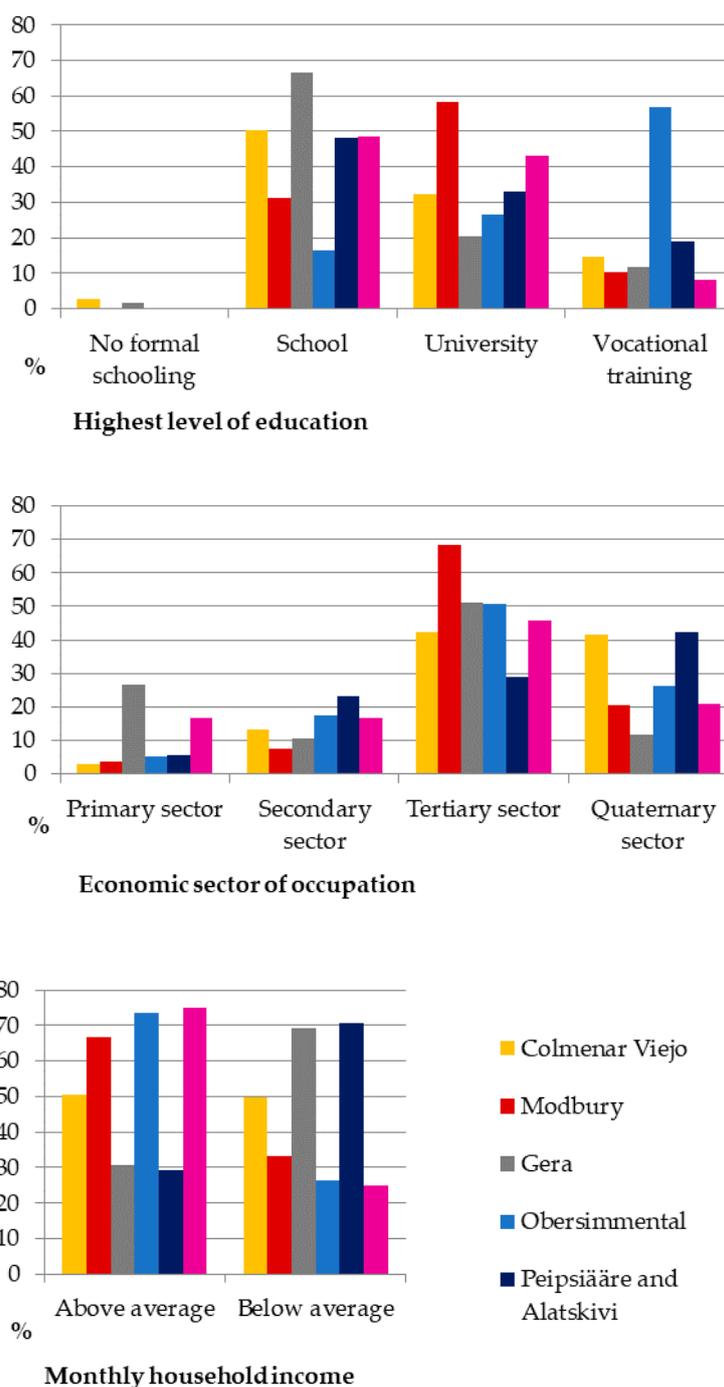


Figure A1. Sample socio-economic characteristics, by study site.

As shown in Figure A1, the socio-economic characteristics of the sample revealed some differences between the study cases. In Modbury, Obersimmental and Börje, about 70% of the respondents had a household income above the local average, whereas in Gera and Peipsiääre and Alatskivi, this percentage only reached 30%. In all cases, the tertiary economic sector was the most common, followed by occupations in the quaternary and then in the secondary sectors. The primary sector was only represented in Gera and Börje. As for level of education, there were important differences between the sites: In Obersimmental, the highest level of education of most respondents was vocational training, in Modbury university and in Gera school.

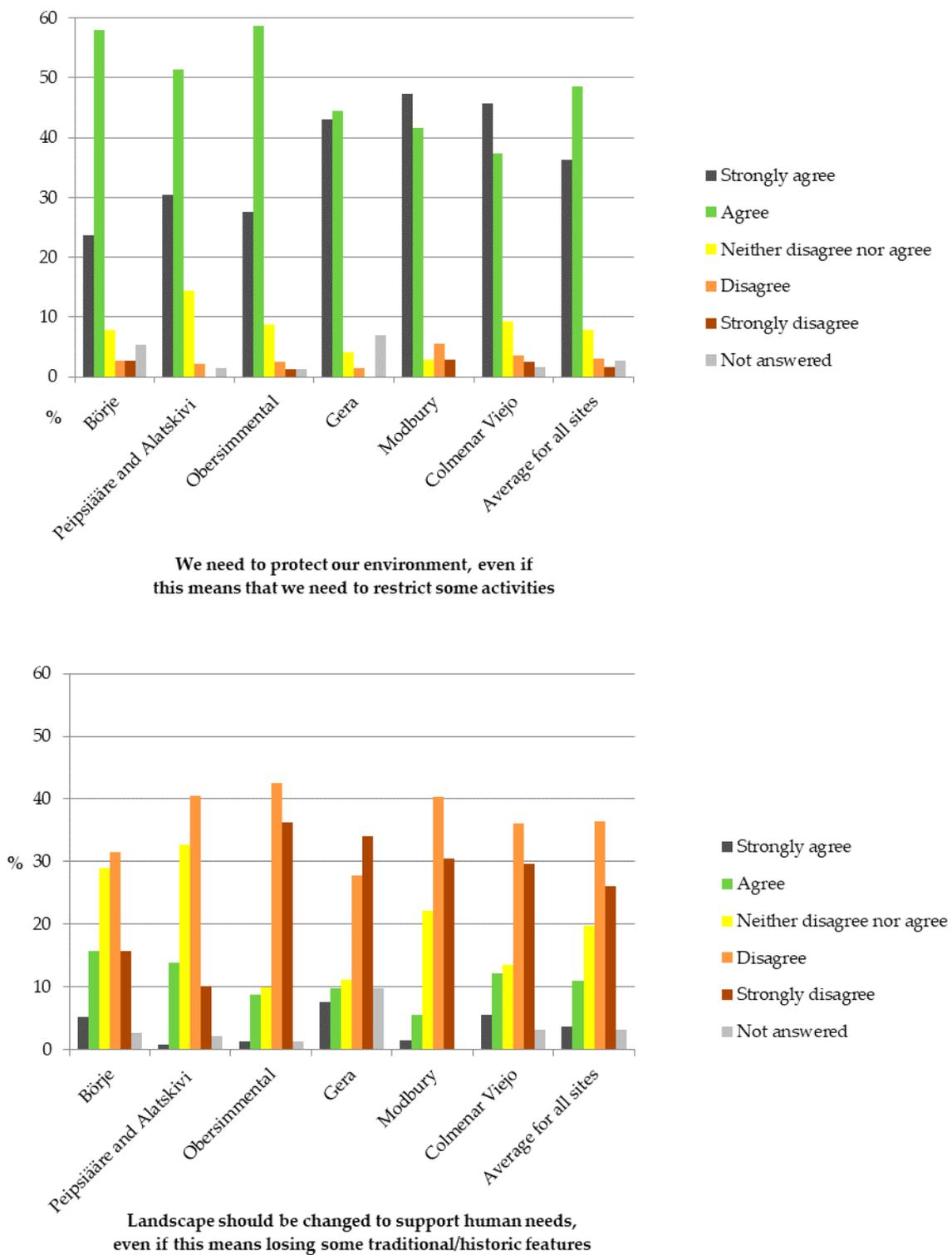
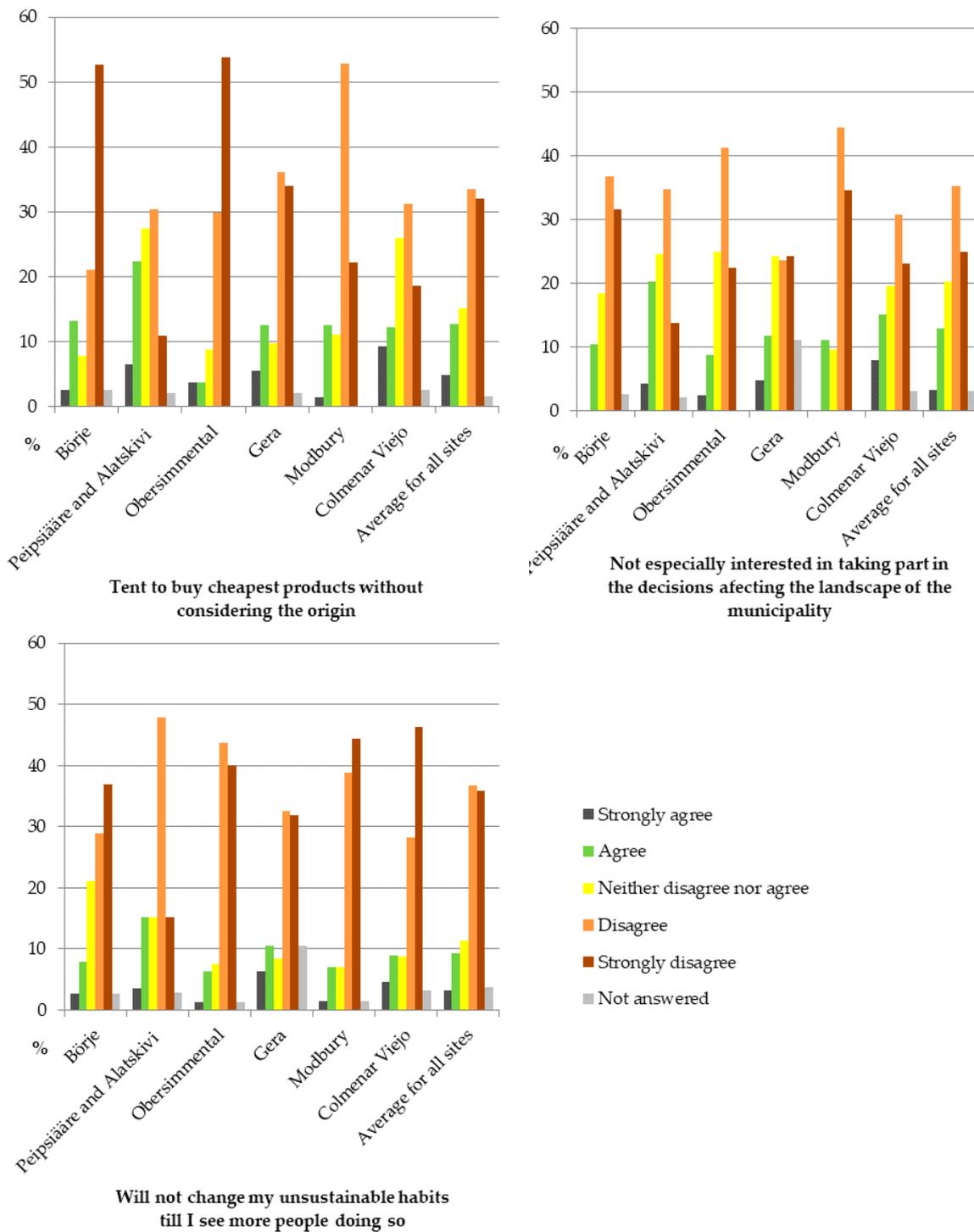


Figure A2. Levels of respondent agreement with statements associated with awareness, by study site.



**Figure A3.** Levels of respondent agreement with statements associated with personal responsibility, by study site.

**Table A4.** Spearman's rank correlation coefficient between levels of place attachment, awareness, and personal responsibility (correlation coefficients are strong when  $\geq 0.5$ , moderate when between  $\geq 0.3$  and  $< 0.5$ , and weak when  $< 0.3$  [48]. \*  $P < 0.05$  \*\*  $P < 0.01$  \*\*\*  $P < 0.001$ .

All Study Sites Together ( $n = 660$ )	Awareness	Responsibility
Awareness	1	
Responsibility	0.345 ***	1
Attachment	0.083 *	0.146 ***
Peipsiääre and Alatskivi ( $n = 128$ )	Awareness	Responsibility
Awareness	1	
Responsibility	0.297 **	1
Attachment	0.134	0.073
Börje ( $n = 34$ )	Awareness	Responsibility
Awareness	1	
Responsibility	0.398 *	1
Attachment	0.122	0.381 *
Modbury ( $n = 71$ )	Awareness	Responsibility
Awareness	1	
Responsibility	0.382 **	1
Attachment	-0.083	0.436 ***
Colmenar Viejo ( $n = 128$ )	Awareness	Responsibility
Awareness	1	
Responsibility	0.380 ***	1
Attachment	0.067	0.131 *
Gera ( $n = 114$ )	Awareness	Responsibility
Awareness	1	
Responsibility	0.255 **	1
Attachment	0.149	0.008
Obersimmental ( $n = 77$ )	Awareness	Responsibility
Awareness	1	
Responsibility	0.250 *	1
Attachment	0.044	0.022

**Table A5.** Spearman's rank correlation coefficient between levels of agreement with survey statements (correlation coefficients are strong when  $\geq 0.5$ , moderate when between  $\geq 0.3$  and  $< 0.5$ , and weak when  $< 0.3$  [48]. \*  $P < 0.05$  \*\*  $P < 0.01$  \*\*\*  $P < 0.001$ ).

All Study Sites Together ( $n = 660$ )	We Need to Protect Our Environment ...	Landscape Should Be Changed ...	I Feel Attached to This Place	I Tend to Buy the Cheapest Products ...	I Am Not Especially Interested (...) in the Decisions ...
We need to protect our environment, even if this means that we need to restrict some activities	1				
Landscape should be changed to support human needs, even if this means losing some traditional features	0.180 ***	1			
I feel attached to this place	0.140 ***	0.040	1		
I tend to buy the cheapest products without considering their origin	0.187 ***	0.198 ***	0.099 *	1	
I am not especially interested in being involved in the decisions affecting the landscape of the area	0.239 ***	0.188 ***	0.175 ***	0.197 ***	1
I will not change my (unsustainable) habits until I see more people doing so	0.255 ***	0.198 ***	0.057	0.177 ***	0.174 ***
Gera ( $n = 144$ )	We need to protect our environment ...	Landscape should be changed ...	I feel attached to this place	I tend to buy the cheapest products ...	I am not especially interested (...) in the decisions ...
We need to protect our environment, even if this means that we need to restrict some activities	1				
Landscape should be changed to support human needs, even if this means losing some traditional features	0.090	1			
I feel attached to this place	0.178	0.080	1		
I tend to buy the cheapest products without considering their origin	0.269 **	0.124	0.115	1	
I am not especially interested in being involved in the decisions affecting the landscape of the area	0.340 ***	-0.012	0.058	0.156	1
I will not change my (unsustainable) habits until I see more people doing so	0.350 ***	0.144	-0.057	0.209 *	0.186 *
Obersimmental ( $n = 77$ )	We need to protect our environment ...	Landscape should be changed ...	I feel attached to this place	I tend to buy the cheapest products ...	I am not especially interested (...) in the decisions ...
We need to protect our environment, even if this means that we need to restrict some activities	1				
Landscape should be changed to support human needs, even if this means losing some traditional features	0.262 *	1			
I feel attached to this place	-0.065	0.149	1		
I tend to buy the cheapest products without considering their origin	0.339 **	0.170	-0.058	1	
I am not especially interested in being involved in the decisions affecting the landscape of the area	0.020	0.078	0.114	0.209	1
I will not change my (unsustainable) habits until I see more people doing so	0.225 *	0.205	-0.013	0.529 ***	0.183

Table A5. Cont.

All Study Sites Together ( <i>n</i> = 660)	We Need to Protect Our Environment ...	Landscape Should Be Changed ...	I Feel Attached to This Place	I Tend to Buy the Cheapest Products ...	I Am Not Especially Interested ( ... ) in the Decisions ...
Peipsiääre and Alatskivi ( <i>n</i> = 128)	We need to protect our environment ...	Landscape should be changed ...	I feel attached to this place	I tend to buy the cheapest products ...	I am not especially interested ( ... ) in the decisions ...
We need to protect our environment, even if this means that we need to restrict some activities	1				
Landscape should be changed to support human needs, even if this means losing some traditional features	0.046	1			
I feel attached to this place	0.248 **	−0.001	1		
I tend to buy the cheapest products without considering their origin	0.071	0.304 **	−0.013	1	
I am not especially interested in being involved in the decisions affecting the landscape of the area	0.194 *	0.062	0.122	0.081	1
I will not change my (unsustainable) habits until I see more people doing so	0.108	0.126	0.103	0.163	0.209 *
Börje ( <i>n</i> = 34)	We need to protect our environment ...	Landscape should be changed ...	I feel attached to this place	I tend to buy the cheapest products ...	I am not especially interested ( ... ) in the decisions ...
We need to protect our environment, even if this means that we need to restrict some activities	1				
Landscape should be changed to support human needs, even if this means losing some traditional features	−0.025	1			
I feel attached to this place	0.341 *	−0.009	1		
I tend to buy the cheapest products without considering their origin	0.438 *	0.221	0.474 **	1	
I am not especially interested in being involved in the decisions affecting the landscape of the area	0.375 *	0.246	0.365 *	0.644 ***	1
I will not change my (unsustainable) habits until I see more people doing so	0.109	0.112	0.123	0.087	0.267
Modbury ( <i>n</i> = 71)	We need to protect our environment ...	Landscape should be changed ...	I feel attached to this place	I tend to buy the cheapest products ...	I am not especially interested ( ... ) in the decisions ...
We need to protect our environment, even if this means that we need to restrict some activities	1				
Landscape should be changed to support human needs, even if this means losing some traditional features	0.159	1			
I feel attached to this place	0.035	−0.140	1		
I tend to buy the cheapest products without considering their origin	0.299 *	0.165	0.156	1	
I am not especially interested in being involved in the decisions affecting the landscape of the area	0.258 *	0.308 **	0.321 **	0.210	1
I will not change my (unsustainable) habits until I see more people doing so	0.319 **	0.087	0.339 **	0.217	0.220

Table A5. Cont.

All Study Sites Together (n = 660)	We Need to Protect Our Environment ...	Landscape Should Be Changed ...	I Feel Attached to This Place	I Tend to Buy the Cheapest Products ...	I Am Not Especially Interested ( ... ) in the Decisions ...
Colmenar Viejo (n = 236)	We need to protect our environment ...	Landscape should be changed ...	I feel attached to this place	I tend to buy the cheapest products ...	I am not especially interested ( ... ) in the decisions ...
We need to protect our environment, even if this means that we need to restrict some activities	1				
Landscape should be changed to support human needs, even if this means losing some traditional features	0.244 ***	1			
I feel attached to this place	0.126	0.026	1		
I tend to buy the cheapest products without considering their origin	0.148 *	0.163 *	0.004	1	
I am not especially interested in being involved in the decisions affecting the landscape of the area	0.241 ***	0.285 ***	0.207 **	0.133 *	1
I will not change my (unsustainable) habits until I see more people doing so	0.247 ***	0.199 **	0.086	0.060	0.086

Table A6. Statistically significant relationships between place attachment, awareness, and personal responsibility and perception of landscape values. Percentages correspond to the number of respondents falling into each level of attachment, awareness, or responsibility among those respondents that perceive the landscape values listed. P value represented as: \*  $P \leq 0.05$ , \*\*  $P \leq 0.01$ , \*\*\*  $P \leq 0.001$ .

All Study Sites Together (n = 726)	Level of Awareness					X <sup>2</sup> Value (df 5)	Level of Personal Responsibility					X <sup>2</sup> Value (df 5)	Level of Place Attachment					X <sup>2</sup> Value (df 5)
	Very High	High	Med.	Low	Very Low		Very High	High	Med.	Low	Very Low		Very High	High	Med.	Low	Very Low	
Personal fulfilment	45%	38%	10%	6%	1%	20.87 ***	38%	35%	23%	4%	0%	37.37 ***	61%	25%	6%	3%	5%	14.84 **
Appreciation of its existence	45%	41%	9%	4%	1%	12.62 *	38%	36%	23%	2%	1%	28.78 ***	56%	31%	5%	4%	4%	20.77 ***
Social fulfilment													56%	31%	5%	4%	4%	20.77 ***
Appreciation of the cultural heritage							36%	32%	28%	3%	1%	16.85 **	58%	28%	6%	4%	4%	22.29 ***
Appreciation of the beauty							34%	33%	27%	5%	1%	11.59 *	55%	30%	5%	5%	5%	22.08 ***
Appreciation of regulating ecosystem services							35%	32%	30%	3%	0%	13.43 *						
Appreciation of nature							36%	33%	26%	4%	1%	13.33 *						
Appreciation of localised food production													61%	27%	5%	4%	3%	30.54 ***
Appreciation of harvesting possibilities							36%	32%	27%	4%	1%	12.62 *						
Appreciation of outdoor recreation							31%	34%	29%	5%	1%	15.98 **						

**Table A7.** Results of the factor analysis combining levels of place attachment, awareness, and personal responsibility and socio-demographic background variables for the active population. Factor loadings based on a principal components analysis with varimax rotation for 11 items. Factor loadings <0.3 are suppressed.

Factor pattern	All Study Sites ( <i>n</i> = 328)		North-Western Sites ( <i>n</i> = 111)		Mediterranean Sites ( <i>n</i> = 177)		Peipsiääre and Alatskivi ( <i>n</i> = 40)	
	F1	F2	F1	F2	F1	F2	F1	F2
Age	0.313		0.300		0.356			0.465
Education		0.683		0.643		0.670		0.730
Occupation	−0.318	0.370		0.312	−0.427	0.450		
Income		0.704	−0.315	0.739		0.700		0.379
Know the area	0.715		0.656		0.731		0.669	
Years living in the area group	0.797		0.830		0.794		0.722	
Antecedents in the area	0.706	−0.360	0.685		0.765	−0.333	0.715	
Land ownership	0.653		0.452	0.597	0.826			0.810
Awareness		0.475	0.414			0.621	−0.740	
Responsibility		0.689	0.302	0.551		0.592	−0.539	0.382
Attachment	0.659		0.301	−0.337	0.758		0.531	
Eigenvalue	2.909	1.822	2.368	1.936	3.568	1.946	3.836	1.895
Variability (%)	26.448	16.560	21.523	17.596	32.439	17.695	34.873	17.225
Cumulative %	26.448	43.008	21.523	39.119	32.439	50.134	34.873	52.098
Cronbach's alpha	0.731	0.563	0.561	0.371	0.814	0.603	0.198	0.652

**Table A8.** Results of the factor analysis by study site, combining levels of place attachment, awareness, and personal responsibility and socio-demographic background variables. Factor loadings based on a principal components analysis with varimax rotation for 10 items. Factor loadings <0.3 are suppressed.

Factor pattern	Colmenar Viejo ( <i>n</i> = 196)		Modbury ( <i>n</i> = 58)		Gera ( <i>n</i> = 100)		Obersimmental ( <i>n</i> = 68)		Peipsiääre and Alatskivi ( <i>n</i> = 108)		Börje ( <i>n</i> = 29)	
	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2
Age						0.815		0.444			0.889	
Education		0.684	−0.493	0.345	−0.557			0.712		0.730		0.375
Income		0.688	−0.435	0.507		0.294		0.671		0.491	−0.887	
Know the area	0.785		0.751		0.454	0.381	0.710		0.822		0.515	
Years living in the area	0.735		0.827		0.790		0.724		0.714		0.579	
Antecedents in the area	0.774		0.476	0.414	0.801		0.782		0.676	−0.335	0.638	0.709
Land ownership	0.648			−0.400		0.923	0.448	0.555		0.498	0.675	0.617
Awareness		0.715		0.825	−0.429			0.313		0.512		0.734
Responsibility		0.680		0.631	−0.595	0.377		0.742	−0.320	0.691		0.773
Attachment	0.660		0.370		0.600		0.597		0.710		0.348	0.663
Eigenvalue	2.714	1.976	2.055	1.905	3.082	1.687	2.548	2.075	2.534	1.850	4.440	1.512
Variability (%)	27.139	19.757	20.552	19.053	30.819	16.866	25.480	20.754	25.337	18.495	44.400	15.124
Cumulative %	27.139	46.897	20.552	39.605	30.819	47.685	25.480	46.234	25.337	43.832	44.400	59.524
Cronbach's alpha	0.707	0.649	0.313	0.346	0.370	0.629	0.693	0.611	0.630	0.556	0.252	0.725

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