Linkages between landscapes and human well-being: An empirical exploration with short interviews [1]

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Abstract

Human well-being is tightly linked to the natural environment. Although this notion is well-established, it remains difficult to assess how the biophysical features of a specific area contribute towards the well-being of the people attached to it. We explore this topic using the case of four areas in Germany and Austria by performing open, single-question interviews with 262 respondents. Data reveal an outstanding relevance of nonmaterial values. Linkages between landscapes and human well-being are tied to specific features of the material environment but, likewise, practices and experiences play an important role in the creation and acknowledgement of such values. Our results accord with the conceptual outline of the cultural values model but fit to a lesser degree into the ecosystem services framework. Due to the high relevance of experiential factors, providing manifold opportunities for people to engage with their natural surroundings should be considered a strategy for fostering human well-being.

1 Introduction

What makes life good is one of humankind's most fundamental questions, one which has been addressed throughout recorded history in the course of philosophical debates. But this question also underlies a multitude of daily decisions at all levels – from individuals and households to nations and beyond. Human well-being, also termed quality of life or welfare, may be considered in terms of objective conditions (e.g., income), but is increasingly being seen in conjunction with subjective perceptions (e.g., satisfaction with income) (Rapley, 2003; for an integrated approach, see Costanza et al., 2007). No matter the approach chosen, however, human well-being is typically addressed through focusing on issues such as economic resources, health and education (for a current example see OECD, 2011), whereas linkages to our natural surrounding are rarely considered.

Yet, given recent experiences of extreme droughts, soil degradation and a multitude of other existent or foreboding ecological crises around the world, this view has been undergoing revision. In 2005, the Millennium Ecosystem Assessment (MA, 2005) presented the first and much-acknowledged attempt to comprehensively assess how nature contributes towards human well-being. Several recent studies have enhanced and substantiated this framework. Shedding light on the fact that changes in well-being may also affect generation of ecosystem services, Reyers et al. (2013) point to their bi-directional interconnectedness. As Butler and Oluoch-Kosura (2006) put it, there is co-evolution between ecosystem services and well-being. Such complex linkages are also stressed by Summers et al. (2012), who provide a detailed outline of the various elements of human well-being and their interplay. King et al. (2013) review the rapidly developing field of approaches being used to elicit and analyze the ecological embeddedness of human well-being. Smith et al. (2013) and Yang et al. (2013) lay the ground for development of quantitative measures and indices to capture relationships between ecosystem services and human well-being. In this context, Engelbrecht (2009) stresses the importance of subjective well-being indicators. Acknowledging the profoundly normative character of ecosystem service valuation (Wilson and Howarth, 2002), King et al. (2013) call particularly for participatory approaches. The context-specific, place-based and time-dependent character of linkages between ecosystem services and human well-being has been highlighted by Wu (2013).

Although using a different terminology, the subjective values attached to nature have also become a focus of the research community formed around the concept of cultural landscapes. The most fundamental premise of this approach stresses the inextricable interconnectedness of relationships between humans and nature (Jones, 2003; Matthews and Selman, 2006). According to the European Landscape Convention (Council of Europe, 2000), cultural landscapes are defined as "an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors". Thus, the cultural landscape approach acknowledges not only biophysical features, but also the ways in which people create meaning and value out of the material world, addressing issues such as sense of place and aesthetic or spiritual values embedded in landscapes. Due to the long history of human involvement with nature, almost all areas in Europe can be considered cultural landscapes. Therefore, in the following we refer to the term 'landscape' bearing in mind the fact that in our study areas almost all natural phenomena has been altered by human influence.

Despite pronounced efforts towards conceptualizing and understanding how nature contributes to human well-being, empirical studies that address this topic in a comprehensive

manner have only recently evolved. For instance, Santos-Martín et al. (2013) show how the relationship between ecosystem services and well-being can be empirically unraveled at a national level by using equation models, while Petrosillo et al. (2013) provide an example of the use of local-level subjective indicators. However, this remains a heavily underexplored field, especially in terms of finding explicit answers concerning the basic question: In what ways are people's well-being linked to specific geographical areas that they are attached to, for example, as residents? Developing answers to this question is particularly challenging with regard to those factors that cannot be measured in terms of material outcomes (such as can be done, e.g., for food production), that is, concerning nonmaterial landscape values or the category of cultural ecosystem services – factors that have outstanding importance in strongly human-influenced cultural landscapes (Bieling and Plieninger, 2013; Daniel et al., 2012; Schaich et al., 2010). Given that these values to a great extent depend on human perceptions, attitudes and socio-cultural norms, research in this field must necessarily build on social sciences-based approaches. Typical methods used to elicit such nonmaterial factors include extensive surveys or interviews (see review in Hernández-Morcillo et al., 2013), sometimes extended by creative components such as nature journaling (e.g., Natural England, 2009) or participatory mapping (e.g., Plieninger et al., 2013). Other studies build on analysis of indirect evidence (e.g. travel costs incurred by visitors, van Berkel and Verburg, 2013). Yet most of these approaches are time-consuming, and some are framed within conceptual propositions – such as explicitly using the terminology and categories developed within the Millennium Ecosystem Assessment – which do not necessarily match how people would express perceived landscape services, benefits and values (Bieling, 2013).

Against this background, the present study aims at testing an open and rapid approach towards grasping the linkages between landscapes and human well-being, thereby seeking to enhance empirical evidence and advance conceptual outlines regarding them. Following an approach that explicitly focuses on landscapes (cf. Sayer et al., 2013), we investigate a) the linkages that people perceive between a landscape that they are attached to and their subjective well-being and b) how these linkages differ across social variables (e.g., respondent groups like farmers and visitors) and different biophysical contexts (place characteristics like dominant landscape features and land uses).

2 Key concepts

This study draws on two concepts that are central to the study of linkages between nature-based surroundings and human well-being: the ecosystem services framework and the cultural values model.

2.1 Ecosystem services

The ecosystem services framework has been developed in order to analyze, in a comprehensive and systematic way, how ecosystems contribute to human well-being. Since its application in the Millennium Ecosystem Assessment (MA, 2005), the concept has increasingly been taken up as a standard component in all kinds of assessments and programs, such as in the European Union's Biodiversity Strategy to 2020 (European Commission, 2011) or local-scale studies (Pereira et al., 2005). Within this framework, ecosystems and human well-being are linked by ecosystem services, defined as the benefits people obtain from ecosystems, commonly grouped into provision services (products like e.g. food), regulating

services (benefits obtained from regulation of ecosystem processes, e.g. climate regulation), and cultural services (nonmaterial benefits, e.g. recreation) (MA, 2003).

According to the Millennium Ecosystems Assessment, these types of ecosystem services are linked to a varying extent to the determinants and components of human well-being. For instance, provisioning services extensively contribute to the provision of basic materials for a good life, whereas regulating services have a particular significance for security. For cultural ecosystem services, the Millennium Ecosystem Assessment framework depicts less intensive linkages to human well-being than for the other types of services. However, there are less possibilities to substitute degraded cultural ecosystems than provisioning and regulating services (whose degradation can to a certain extent be mediated by, for instance, technical solutions or substitutes) (MA, 2005: vi).

2.2 Landscape values

With her cultural values model, Stephenson (2008) presents an approach for conceptualizing the multiple ways in which people value landscapes. Aiming at a holistic conceptual structure, the model integrates the two basic understandings of landscapes as a biophysical as well as a socio-cultural phenomenon (Termorshuizen and Opdam, 2009). Stephenson draws on an extensive literature survey on landscape value models and empirical findings from New Zealand. On the basis of clustering of values evident from the case studies and on commonalities between conceptual outlines in the different disciplinary approaches, she distinguishes three components of values attributed to landscapes:

- − Forms: physical, tangible and measurable aspects (e.g., vegetation, historic features, natural landforms, human-made structures);
- − Practices: human practices and natural processes, acknowledging "that human practices and the processes of nature are a continuum of dynamic action rather than conceptually separate" (Stephenson, 2008: 134) (e.g., ecological processes, historic events, human activities); and
- − Relationships: values based on people–people interactions in the landscape or on people–landscape interactions; including also valued relationships within a landscape where there is little or no direct human involvement (e.g., sense of place, aesthetics, sensory responses, memories, meanings, ecological relationships).

Stephenson (2008) highlights that values embedded in landscapes have a pronounced dynamic and temporal dimension. Landscape forms, practices and relationships interact and reinforce each other over time.

3 Study sites

Different ecosystem or landscape types, including varying dominant landscape features, geomorphology, population density, land uses, and protection status may express or result in different human–nature relationships. In order to span a range of these relationships and corresponding values, this study was conducted in four sites in Germany and Austria (Figure 1) that contrast regarding their main characteristics, an overview over which is given in Table 1.

3.1 Freiburg / Black Forest (Germany)

The city of Freiburg (48° 0' N, 7° 50' E) has about 210,000 inhabitants and is located at the foothills of the Black Forest, a strongly undulated low mountain range with a mosaic of deciduous forests and grassland. Typical for the city is its proximity to the surrounding rural landscape: remote forest areas can be reached within a 15 minute walk from the city center. The region attracts many tourists.

3.2 Swabian Alb (Germany)

The Swabian Alb (48° 23' N, 9° 27 E) is a low mountain range. With the sparsely populated Alb plateau and the densely populated foreland in the metropolitan region of Stuttgart, the region exhibits a strong rural–urban divide. Typical landscape features are deciduous forests along the geological formation of the Alb escarpment, orchard meadows, and castles and caves which are visited by many tourists. A central part of the Swabian Alb has been declared a UNESCO biosphere reserve.

3.3 Upper Lusatia (Germany)

Upper Lusatia (51° 19' N, 14° 35' E) is a sparsely populated rural region, covering lowland that is characterized by heathland with interspersed water bodies and forests. Water bodies are an outstanding feature of the area and encompass both traditional fishing ponds and artificial lakes resulting from former mining sites. Part of the area has been declared a UNESCO biosphere reserve.

3.4 Hohe Tauern (Austria)

Hohe Tauern (46° 55' N, 12° 35' E) comprises a central part of the Alps, with mountains rising up to 3,800 m asl. Besides the highest mountain areas, seasonally grazed pastures and valleys with mountain farms and small villages are typical landscape features. Tourism is highly relevant for this rural area, which is protected as a National Park.

4 Methods

We conducted face-to-face interviews with a total of 262 respondents, encompassing residents of the study sites, visitors, and farmers (hypothesizing that farmers may have a different attachment to the area than other local residents). In several field work periods between November 2011 and September 2012, the interviewees were approached in various places, for example, on a hiking trail, at a village market place or at the parking lot of a biosphere reserve's visitor center. Farmers were specifically addressed by visiting farms or farm shops and markets. For two study sites, we explicitly tested different interview locations and conducted a part of the interviews in an "open landscape" setting and other interviews within built environments. Characteristics of the sample are presented in Table A.1.

After a brief introduction of the interviewer, people were asked "How does the landscape here contribute to your well-being? Please briefly report anything that comes to your mind". This approach was inspired by freelisting interviews that are common in ethnographic cultural domain analysis, which is applied to investigate the various ways in which people with different cultural backgrounds shape and interpret physical or conceptual features, for

instance food, kinship systems, or illnesses (Bernard, 2002; Weller and Romney, 1988). Such cultural domains are analyzed by asking people to list all the kinds of the respective feature they know (e.g., kinds of food). Ethnographers relate that, with about 20 to 30 interviews for each cultural group, these lists can help to obtain a comprehensive description of a coherent cultural domain and quantitative comparisons across groups with different backgrounds (Weller and Romney, 1988). Accordingly, we aimed at conducting a minimum of 30 interviews in each study site and for each respondent group (men / women, residents / farmers / visitors, age classes).

After answering the central question, people were asked for their age and, if not yet evident, if they qualify as residents, farmers or visitors. The core interviews lasted from less than a minute to 10 minutes; however, often respondents were inspired to subsequently elaborate on issues like landscape changes or things that make up life in the area. Responses were either directly noted or tape-recorded and transcribed later.

By eliminating redundancies regarding different expressions for the same meaning, responses were condensed to 109 items, which are listed in Table A.2. Several of the items addressed aspects that might not seem connected with human well-being in the first place, for instance those referring to ecosystem features like 'mountains'. However, people frequently named these when explicitly asked for landscape's contributions to well-being; therefore, we considered them as valid. Data were analyzed with IBM SPSS Statistics 20 software. For each item we calculated frequency, mean rank within the list of all items mentioned by the respondents and salience. Salience is a common measure to analyze freelisting interviews. For each item, it combines frequency and mean rank and was calculated according to the index developed by Sutrop (2001): salience = frequency / (number of respondents * mean rank). This index ranges between 1 (item was reported by all respondents and all of them named it first) and 0. In a second step, we assigned items to the types of ecosystem services (Table A.2) and landscape values (Table A.3) and analyzed frequency, mean rank and salience. For comparison across different respondent groups, we used cross-tabulation and Chi² tests. Univariate correlation analyses were carried out for the types of ecosystem services, landscape values and the subcategories of cultural ecosystem services and landscape relationships.

5 Results

5.1 General results
5.1.1 Items with highest salience
Respondents mentioned between one and 26 different aspects of how the local landscape contributes to their well-being (on average 6.8 items), resulting in a total of 109 different items. Table 2 displays the 20 items with highest salience across all respondents, encompassing a broad range of issues that refer to ecosystem features, activities and perceptions and values. The most salient item is 'beauty', followed by 'naturalness, nature', 'mountains', 'tranquility', 'forest, woodland', 'hiking' and 'place attachment, feeling at home'. The most frequently mentioned item, 'beauty', was addressed by more than a third of the interviewees, but also 'trees', which was mentioned by only 6% of the respondents, is due to its high mean rank one of the 20 most salient items.

5.1.2 Ecosystem services

Only 68 out of 109 items mentioned by the respondents could be related to the ecosystem services concept. The remaining 41 items did not address benefits in the sense of the ecosystem services framework, but, for instance, ecosystem or landscape features (like 'hills' or 'sun'). Applying a very inclusive interpretation of the basic typology developed within the Millennium Ecosystem Assessment, we listed five items as indicators for provisioning services, one item as pointing to regulating services and 62 items revealing specific types of cultural ecosystem services (Table A.2).

As Table 3 shows, the interviews only pointed to two provisioning services (habitation, food) and one regulating service (climate regulation), with many (or even most) of the provisioning and regulating services listed as standard features by the ecosystem services framework not having been mentioned by the interviewees at all. In contrast, all subcategories of cultural ecosystem services were addressed. Items indicating aesthetic values, sense of place and recreation and ecotourism were among the ten most salient answers, whereas the items treated as indicators of cultural heritage, inspirational, spiritual / religious, and educational values received much less consideration.

5.1.3 Landscape values

All items resulting from the interviews could be clearly assigned to the subcategories of landscape values, with 32 items categorized as forms, 20 as practices, and 57 as relationships (Table A.3). Table 4 shows for each of these groups the ten most salient items. 'Mountains', 'forest, woodland' and 'water bodies' are the most prominent forms, 'hiking', 'cycling' and 'walking' the top practices, and 'beauty', 'naturalness, nature' and 'tranquility' the most salient relationships. Comparing the subcategories, neither forms nor practices nor relationships have a clearly dominant position, but rather all of them were commonly addressed by the respondents. However, the data for the items assigned to relationships in general scored higher than those for forms and practices (more frequently mentioned, higher mean ranks, higher salience). Based on the sum of the items referring to forms, practices and relationships mentioned by the respondents, we tested pairwise correlations between the three groups of items and found little correlation between forms and practices (Pearson's r=0.228) or forms and relationships (Pearson's r=0.202), but a considerable linkage between practices and relationships (Pearson's r=0.562) (with p≤0.001 in all cases).

With 57 items, the subcategory of relationships encompasses a large and highly diverse range of aspects. In order to further operationalize the investigation of landscape relationships, we tried to identify patterns within this group. In her cultural values model, Stephenson (2008) presents disciplinary interests (e.g., memories, symbols / ideology, meanings) and subcategories of values (e.g., stories and myths, sense of community, genealogical links) as tools to classify landscape relationships. However, we found neither of these approaches useful, since they do not cover the whole range of the items reported by this study's respondents nor do they provide operational delineation. On the basis of common topics and characteristics for the landscape relationships items found, we therefore developed our own typology of landscape relationship subgroups (Fig. 2). All but three items could be assigned to one of these subcategories (Table A.3). Following Gobster et al. (2007), we treated 'beauty'

as a holistic issue, connected with sensory-perceptual, socio-cultural and material relationships, and therefore at the center of human-nature relationships. The largest subcategory that could be clearly distinguished from the others deals with predominantly immaterial relationships, for instance 'joy', 'spirituality', 'strengthening, energizing', though predominantly material relationships are also addressed, including 'self-supply' (of foods or materials), 'income', or 'healthy and good food'. 'Good social relations' and 'family' are examples from the subcategory of socio-cultural relationships. Several items point to relationships that are based on specific landscape qualities, like for instance 'contrasts', 'accessibility', or 'singularity, impressiveness'. The last group encompasses relationships which are due to sensory perceptions like 'scents', 'colors', and 'views'.

5.2. Differences between respondent groups

5.2.1 Age, sex, interview location

Respondents in different age classes showed no differences in rating the various types of ecosystem services and landscape values; this also applies to almost all subcategories of cultural ecosystem services and all landscape relationships (Table A.4 to Table A.8). Only for inspirational values and a few of the 20 most salient items, the data reveal some statistical evidence for differences, but no clear patterns could be identified (Table A.4).

Also for women and men our data show no highly significant differences. There is a slight tendency that women value the items 'views', 'walking', 'capaciousness, vastness', 'beauty', aesthetic values, and landscape relationships based on landscape properties more than men do (Table A.4 to Table A.8).

In interviews conducted in the open landscape, several items received higher consideration than in interviews set within built environments (Table A.4 to Table A.8). In this vein, highly significant patterns ($p \leq 0.001$) exist for 'recreation, relaxation' and landscape practices, and there are also statistically valid differences (but with lower rates of significance) for some other items ('mountains', 'space for doing and experiencing things', 'views') and for landscape relationships – in general as well as for the subcategories of predominantly immaterial relationships and relationships based on sensory perceptions.

5.2.2 Respondent types: residents, visitors, farmers

The interview results contrasted in several regards for the different kinds of respondents; see Table 5. 'Place attachment, feeling at home' and 'cultivating', for example, has a much higher importance for farmers than for other local residents and for visitors. Compared to the other respondents groups, farmers' landscape relationships are also more often based on material factors. Visitors particularly stress the importance of 'recreation, relaxation' and 'unspoiltness, integrity', which are less reported by farmers and especially by other local residents. Several other, but not highly significant, differences for the respondents groups are shown in tables A.4 to A.8. For instance, farmers particularly point to heritage values, and visitors stress 'naturalness, nature' and 'good air'. With above-average scores for several items, visitors and farmers exhibit a similar tendency of explicit appreciation of the local landscape, while residents express less acknowledgement; for instance, both farmers and visitors highlight the role of 'diversity, variedness' and landscape relationships in general, whereas residents mention these much more rarely.

9

5.2.3 Study sites

We found the most distinct differences between answers to be between the four study sites. For 13 out of the 20 most salient items, appreciation contrasts in a highly significant manner between the Freiburg / Black Forest, the Swabian Alb, the Upper Lusatia and the Hohe Tauern regions (Table 6). Likewise, the relevance of provisioning and regulating ecosystem services as well as landscape forms and practices differs strongly. Due to the amount of data, only the highly significant results (p≤0.001) will be presented in the following. The complete set of data, including other diverging patterns with lower statistical significance, is shown in the Annex (Tables A.4 to A.8).

For the most salient items, the respondents from the Freiburg / Black Forest area provided a diversified valuation, highlighting some aspects like 'mountains', 'hiking' and 'walking', while considering others to a lower degree than respondents from the other areas (e.g., 'beauty', 'recreation, relaxation', 'place attachment, feeling at home'). In the Swabian Alb region, people particularly valued 'naturalness, nature' and 'unspoiltness, integrity', but considered the other top 20 items to be relatively unimportant. Respondents from Upper Lusatia pointed even less often to almost all of the 20 most salient items, except 'beauty' and 'water bodies', which they indicated more often than the respondents from the other study sites. In the Hohe Tauern area, interviewees expressed the strongest valuations for all of the most salient items, though for 'beauty' they scored in second place whereas 'water bodies' came up last compared to the other areas.

As shown in Table 6, for provisioning ecosystem services, appreciation was most pronounced in the Hohe Tauern area, followed by the Freiburg / Black Forest, Upper Lusatia and Swabian Alb regions. The item 'good air' used as an indicator for regulating ecosystem services was particularly valued in the Hohe Tauern region, whereas no respondent from Upper Lusatia referred to it. Both landscape forms and practices were given greatest consideration in the Hohe Tauern and Freiburg / Black Forest areas, whereas particularly respondents from Upper Lusatia more rarely addressed them.

A look at the five most frequently mentioned landscape forms, practices, and relationships in the four areas offers more detailed insights. Regarding forms, respondents turn to those landscape features that are also generally considered to be typical for the respective regions (compare Table 1), for instance water bodies in Upper Lusatia and mountains in Hohe Tauern (Figure 3a). 'Hiking', 'cycling' and 'walking' are among the most common landscape practices in all regions, but other highly prominent practices are specific to some sites, such as 'angling, hunting' in Upper Lusatia and 'cultivating' and 'working' in Hohe Tauern (Figure 3b). For the five most common landscape practices, all respondents except those in Upper Lusatia pointed to a process (rather than a practice): 'seasons, natural rhythms'. A similar pattern of commonalities and specificities among the study sites applies to landscape relationships; for example, the three items 'beauty', 'naturalness, nature' and 'tranquility' are among the top five in all investigated areas, whereas others are particularly valued only in some regions (e.g., 'diversity, variedness' in Swabian Alb, 'accessibility' in Freiburg / Black Forest) (Figure 3c).

Highly significant differences exist for some of the subcategories of cultural ecosystem services and all subcategories of landscape relationships (Table 7; for the complete set of data,

containing some more though less significant differences for the types of cultural ecosystem services, see Table A.7). Compared to the interviewees from other areas, those from Freiburg / Black Forest referred particularly rarely to aesthetic values and predominantly immaterial landscape relationships to characterize their surroundings. Here, only recreation and ecotourism, relationships based on sensory perceptions and relationships based on landscape properties were rated relatively high. Meanwhile, people in the Swabian Alb region expressed the lowest valuation of recreation and ecotourism and also relatively low valuation of other aspects of cultural ecosystem services and landscape relationships, except for sense of place and those relationships based on landscape properties. In the Upper Lusatia area, only aesthetic values were considered to a greater extent by respondents, whereas all other aspects received comparably little attention. Respondents in Hohe Tauern rated all aspects of cultural ecosystem services and landscape relationships higher than the respondents from other areas. In Hohe Tauern, almost all of the respondents reported on sense of place and described some kind of predominantly immaterial landscape relationship, and more than nine out of 10 highlighted relationships based on specific landscape properties.

6 Discussion

6.1 Investigating linkages between landscapes and human well-being through freelisting-style interviews

This study has been aimed towards developing and testing a rapid and open interview approach for assessing linkages between landscapes and human well-being. The rich output of 109 different items indicates that such an approach was appropriate in our Central European context. As no interview dates had to be arranged with respondents, the interview process was easy to organize. Interviews could be carried out in very little time, willingness to participate was high, and people appeared to have few difficulties with the question posed. The approach delivered abundant and relevant data on appreciated biophysical features, ways of engaging with the landscape and perceived linkages to well-being. Several people reported that they found it interesting to reflect on the topic raised, and often the interview question served as a stimulus for further elaboration on issues like favorite landscape features. Therefore, this approach may also be valuable as a first step for more extensive interviewing techniques and particularly for approaches that involve stakeholders in learning processes to enhance the understanding of the relationship between natural surroundings and human well-being. We tested whether interview location makes a difference and found that, compared to interviews within built environments, interviews in the open landscape are more apt to elicit relevant mention of landscape practices and, to lower extent, relationships.

The interviewing technique applied in this study strongly resembles freelisting interviews carried out to analyze cultural domains that are mainly based on different kinds of knowledge. However, with linkages between landscapes and well-being, the target of this study was, if at all, not a clearly defined cultural domain. Correspondingly, a broad range of different items were mentioned by the respondents, and salience values were lower than in typical cultural domain analyses (compare Sutrop, 2001). Yet, with around 30 interviews per respondent group a saturation effect was evident, with clearly visible repetition of items already mentioned by other respondents. We therefore argue that the approach was able to provide a very good, though surely not complete, sense of some key features of how landscapes

11

contribute to human well-being in the areas investigated. This assessment is also based on the fact that, as will be discussed in section 6.2, the results of the study match well with those derived from other studies that employed different methods than ours. Moreover, freelisting interviews have also been successfully carried out regarding very similar research questions. Rodríguez et al. (2006), for example, conducted freelisting interviews to identify goods and services valued by local communities. In his classical methods handbook, Bernard (2002: 285) points to the valuable insights delivered by a study with freelisting interviews where people were asked "What are the things that make life good around here?" and concludes that, "The humble free list has many uses. Use it a lot." The present study provides evidence supporting his exhortation.

6.2 Perceptions of landscape-related well-being and differences across respondent groups and site characteristics

This study has provided overwhelming evidence regarding nonmaterial values being attached to landscapes that challenges the perspective of the Millennium Ecosystem Assessment, which suggests that connections between cultural ecosystem services and human well-being tend to be relatively weak (MA, 2005). However, the outstanding role of cultural services over other ecosystem services has been described as a general characteristic of European cultural landscapes (Daniel et al., 2012; Schaich et al., 2010) and has been empirically validated for the Swabian Alb and Upper Lusatia study sites (Bieling, 2013; Plieninger et al., 2013). Nevertheless, it should not be concluded that only the nonmaterial assets captured under the term cultural ecosystem services are important. As MacDonald et al. (2013: 1) point out, little acknowledgement of other types of benefits, such as regulating services, "may reveal a lack of understanding of these functions rather than a discord in values". Moreover, in our study only the local level has been investigated, but benefits and values may accrue differently to stakeholders at other spatial scales (Hein et al., 2006; Martín-López et al., 2009). Finally, the interlinked character of ecosystem service types needs to be considered, as is evident for instance with the item 'self-supply' (of foods or materials), which brings together provisioning services and identity-related issues.

When asked about linkages of their landscape to well-being, respondents frequently mentioned biophysical landscape features. This indicates that the material world indeed matters and that well-being is not a mere product of social construction. This corresponds to findings on sense of place presented by Stedman (2003) as well as to a large-scale analysis on factors that explain life satisfaction at country level, highlighting a particular role for natural capital (Vemuri and Costanza, 2006). Differing site characteristics result in a variety of ways in which the biophysical world contributes towards human well-being. Consequently, landscape-related values or cultural ecosystem services are tightly attached to very specific landscape features, as has been shown by Norton et al. (2012). The present study reveals rich evidence concerning such patterns. Results from the four study sites contrasted in many regards, with respondents pointing to different landscape features of their regions while also depicting some specific landscape practices and stressing different aspects of ecosystem services and landscape values. All in all, we feel that the results reveal a vivid and sound portrait of human–nature interrelationships in the respective areas, pointing for instance to the particular values attached to farming in the Hohe Tauern mountains or, as quite similarly described by Plieninger et al. (2013), to the ponds and lakes in Upper Lusatia.

In line with experiential landscape models (Stedman, 2003), our study reveals that practices, activities, and experiences are closely related to perceived linkages between landscapes and well-being. Asked about landscape contributions to their well-being, respondents reported on manifold ways of engaging with the landscape, such as in terms of doing outdoor sports, taking pictures or appreciating a view; moreover, there is a correlation between described landscape practices and landscape relationships. This may explain some of the differences across respondent groups in terms of valuation of items, ecosystem services and landscape values. Both farmers and visitors are characterized by a high degree of interaction with the biophysical landscape, and these two respondent groups also exhibited a greater appreciation of several items and more pronounced landscape relationships than residents did. Furthermore, the kinds of experiences associated with various lifestyles or cultural backgrounds may result in different ways of seeing the landscape and attaching meaning and value to it, as described for example for residents and experts (Vouligny et al., 2009) or hunters, farmers, and real estate developers (Greider and Garkovich, 1994). In our study, farmers, for instance, exhibited a higher degree of place attachment than other local residents and visitors, and they likewise more often mentioned material aspects of their landscape relationships (compare Schroeder et al., 1985), whereas visitors tended to stress recreational values.

6.3 Conceptualizing the contributions of landscapes to human well-being

Our study reveals that the linkages between landscapes and well-being as perceived by our respondents are, in several regards, hard to fit in the ecosystem services framework, at least when using open freelisting methods. To an overwhelming extent, interviewees mentioned cultural services, whereas provisioning and regulating services were considered only to a very limited degree. However, for more than one third of the items mentioned in the interviews it proved impossible to correlate them with the ecosystem services subcategories given by the framework, although we applied a very inclusive approach and considered several aspects, which, in the initial ecosystem services framework provided by the Millennium Ecosystem Assessment, would have been categorized, for instance, as constituents of well-being rather than ecosystem services (e.g., freedom or health). A great part of the answers could not be placed under the ecosystem services outline still, like those numerous items pointing towards biophysical features. Further developments of the ecosystem services framework like CICES Version 4.3 (EEA, 2013) may be helpful to overcome some of these difficulties, particularly in terms of a stronger acknowledgement of the role of activities for cultural ecosystem services. In some regards, however, the CICES classification involves other problems for integrating our empirical data. For instance, aesthetic values are grouped under intellectual and representative interactions – a notion which does not comply with their holistic and experiential character as described in the interviews. Likewise, we found it impossible to distinguish between physical and experiential use of ecosystem features and therefore could not connect several specific activities with the framework, but also the frequently mentioned general item 'recreation, relaxation'. For another example, many of the items that in the Millennium Ecosystem Assessment classification could be treated as indicators of sense of place could not be clearly related to any class, group or division of the CICES concept.

This stark mismatch between empirical results and conceptual outline is astonishing, as the interview question addressed exactly what the ecosystem services framework aims to

conceptualize – the contributions of ecosystems to human well-being. However, Busch et al. (2011) have also reported on conceptual difficulties in connecting ecosystem benefits with well-being. Based on our study's empirical findings, we see two basic weaknesses of the ecosystem services framework. Firstly, it is not suitable for capturing the holistic character of landscape-related benefits and values, particularly regarding the nonmaterial aspects labeled as cultural ecosystem services. For instance, aesthetics, recreation, sense of place and cultural heritage values are so closely interrelated that it is not possible to treat them as separate units. The need to think of bundles rather than individual and separate services has been pointed to in several other recent studies (Daniel et al., 2012; Martín-López et al., 2012; Raudsepp-Hearne et al., 2010), and an alternative classification considering this and other deficiencies of the ecosystem services framework has been outlined by Chan et al. (2012). Moreover, the distinction of ecosystem services from the biophysical features that deliver them and particularly the distinction of services from determinants and components of well-being are not in line with people's perceptions and ways of thinking.

Secondly, the ecosystem services concept does not sufficiently acknowledge human-based creation of benefits and values and, thereby, may dismiss an important aspect of the linkage between nature and human well-being. As Ernstson (2013) argues, ecosystem services are crucially dependent on social processes. Our study, however, provides even more evidence for the creation of meaning and values through the manifold ways of (mostly) individually engaging with place, which goes beyond an acknowledgement of some recreational activities. This is also highlighted by the correlation between stated landscape practices and relationships, which were less linked to biophysical landscape features. In this vein, Smith (2006) for instance describes for heritage values that they have to be seen as a process of acquiring or engaging with a sense of history, rather than being rooted predominantly in certain site characteristics. With several authors proposing similar lines of thought (e.g., Ingold, 2000), Stephenson (2008) consequently proposed practices and processes as a component in the cultural values model. The landscape values typology developed within this model is generally very much in line with the results of the present study, as all items derived from our open interviews could be integrated within this framework and its three-fold typology was a convincing tool to structure and guide data analysis. For landscape relationships, however, we found further operationalization in the form of subcategories necessary.

7 Conclusion

Linkages between human well-being and the natural environment are increasingly being acknowledged in science, policy and management. This is evident from the rise of the ecosystem services framework in scientific publications, political programs and management plans (Schaich et al., 2010). Current attempts at considering natural capital or environmental issues more explicitly in large-scale indices of human welfare, such as in the course of developing a green GDP (Boyd, 2007), also need to be seen in this context. Likewise, human well-being is treated as a central issue in sustainable development at the local level (e.g., Kazana and Kazaklis, 2009). Our study has examined four areas in Central Europe where people indeed perceive strong linkages between the landscapes they are attached to and their subjective well-being. From a conceptual point of view, these linkages can be better framed within the cultural values model than within the ecosystem services framework. The cultural

values model seems closer to people's conceptualizations but it is less elaborated and does not explicitly contribute to clarifying the linkages between landscape values and well-being.

These linkages are associated with specific features of the material environment but, we hold, are simultaneously prompted by practices and experiences gathered in the course of engaging with landscapes. Therefore, to safeguard and foster human well-being, the preservation and sustainable development of biophysical landscape features has to be pursued, not just in their own right, but also because of the role they play in engendering valued practices and relationships. Moreover, and up to now more rarely considered, the relevance of experiential factors calls for raising public awareness concerning landscapes, fostering knowledge in the course of environmental education and providing manifold opportunities for people to engage with their natural surroundings.

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16

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Figure 1.

Location of the Freiburg/Black Forest, Swabian Alb, Upper Lusatia, and Hohe Tauern study sites.
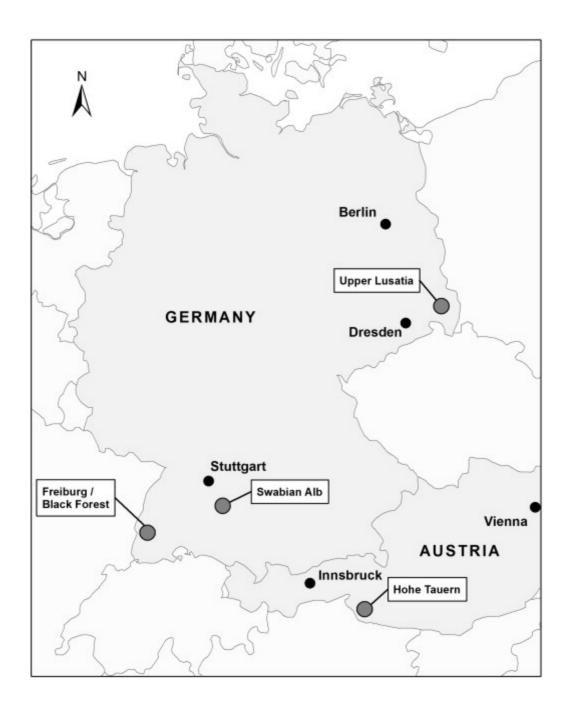
Figure 2.

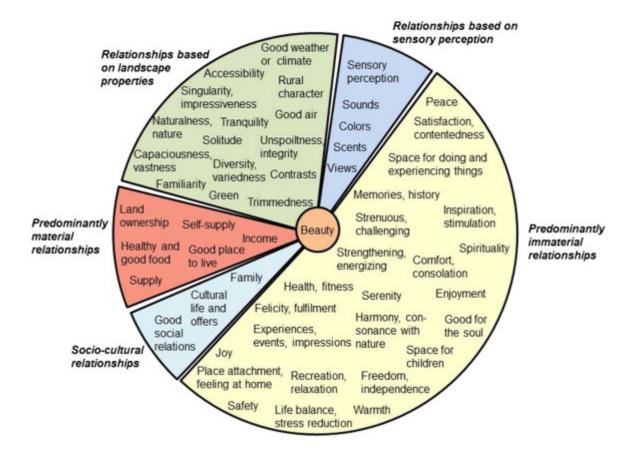Overview of the items assigned to subcategories of the landscape values type 'relationships'.

Figure 3.

Landscape values in investigation areas: five most frequently mentioned a) forms, b) practices (including processes), and c) relationships (n = 262).
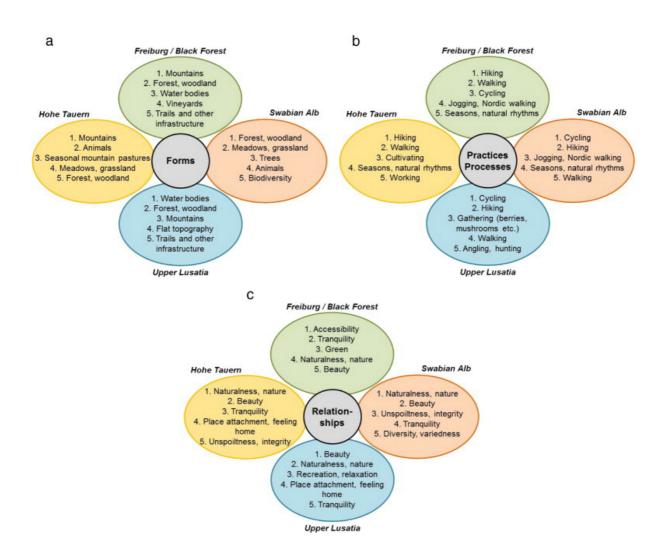
Table 1.

Main study-site characteristics.

	Freiburg/Black Forest[1]	Swabian Alb[2]	Upper Lusatia[3]	Hohe Tauern[4]
Geomorphology	Lowland/low mountain range	Low mountain range	Lowland	High mountain range
Characteristic landscape features	Conifer forests; orchards and vineyards in the foothills	Orchards, deciduous forests at Alb escarpment, castles, caves	Heathland with interspersed ponds, forests	High mountains, seasonally grazed mountain pastures
Characteristic land uses	Forestry, livestock farming, tourism	Agriculture, forestry, tourism	Fish farming, agriculture	Alpine farming, tourism
Rural/urban character	Urban–rural divide (densely populated areas and remote rural regions)	Urban–rural divide (densely populated areas and remote rural regions)	Predominantly remote rural area	Predominantly remote rural area
Landscape-scale protection status	None	UNESCO biosphere reserve	UNESCO biosphere reserve	National park

1 Focus on the parts of the Black Forest that are adjacent to the city of Freiburg.

2 Focus on the central parts of the biosphere reserve around the city of Münsingen.

3 Focus on the central parts of the biosphere reserve around Guttau.

4 Focus on the area around Matrei in Eastern Tyrol.

Table 2.

Percentage of respondents mentioning, mean rank and salience for 20 items with highest salience (n = 262).

Items	% of respondents mentioning	Mean rank	Salience (Sutrop index)	Rank salience
Beauty	36.6	3.59	0.1020	1
Naturalness, nature	31.3	4.17	0.0751	2
Mountains	21.8	3.98	0.0546	3
Tranquility	23.3	4.74	0.0491	4
Forest, woodland	17.9	4.45	0.0403	5
Hiking	30.2	7.48	0.0403	6
Place attachment, feeling at home	17.2	4.53	0.0380	7
Unspoiltness, integrity	16.0	4.36	0.0368	8
Water bodies	10.3	2.85	0.0361	9
Recreation, relaxation	19.1	5.40	0.0353	10
Green	9.5	3.48	0.0274	11
Cycling	12.6	5.15	0.0245	12
Diversity, variedness	7.3	3.05	0.0238	13
Good air	13.0	5.62	0.0231	14
Space for doing and experiencing things	10.7	4.79	0.0223	15
Walking	15.3	7.18	0.0213	16
Trees	6.1	3.25	0.0188	17
Views	11.0	6.32	0.0169	18
Capaciousness, vastness	8.4	5.09	0.0165	19
Cultivating	9.5	5.92	0.0161	20

Table 3.

Percentage of respondents mentioning and mean salience for ecosystem service types (for items assigned to each type see Table A.2; n = 262).

		% of respondents mentioning	**Mean salience of respective items (Sutrop index)**
Provisioning ecosystem services	Habitation[1]	3.8	0.0109
	Food[2]	12.6	0.0054
Regulating ecosystem services	Climate regulation[3]	13.0	0.0231
Cultural ecosystem services	Aesthetic values[4]	50.4	0.0169
	Sense of place[5]	74.4	0.0152
	Recreation and ecotourism[6]	53.8	0.0105
	Cultural heritage values[7]	5.7	0.0039
	Inspirational values[8]	8.4	0.0039
	Spiritual/religious values[9]	1.9	0.0027
	Educational values[10]	5.0	0.0032

1 Item 'good place to live'.

2 Respondents who mentioned at least one out of the respective four items.

3 Item 'good air'.

4 Respondents who mentioned at least one out of the respective nine items.

5 Respondents who mentioned at least one out of the respective 26 items.

6 Respondents who mentioned at least one out of the respective 17 items.

7 Respondents who mentioned at least one out of the respective two items.

8 Respondents who mentioned at least one out of the respective three items.

9 Item 'spirituality'.

10 Respondents who mentioned at least one out of the respective two items.

Table 4.

Percentage of respondents mentioning, mean rank and salience for landscape value types (for each type, the ten items with highest salience are indicated; n = 262).

		% of informants mentioning	Mean rank	Salience (Sutrop index)	Rank salience
Forms	Mountains	21.8	3.98	0.0546	3
	Forest, woodland	17.9	4.45	0.0403	5
	Water bodies	10.3	2.85	0.0361	9
	Trees	6.1	3.25	0.0188	17
	Meadows	9.9	6.50	0.0153	21
	Hills	3.8	2.70	0.0141	23
	Valley	5.0	3.92	0.0127	26
	Trails and other infrastructure	6.5	5.35	0.0121	28
	Animals	10.7	9.43	0.0113	30
	Flat topography	1.9	2.00	0.0095	35
Practices (including processes)	Hiking	30.2	7.48	0.0403	6
	Cycling	12.6	5.15	0.0245	12
	Walking	15.3	7.18	0.0213	16
	Cultivating	9.5	5.92	0.0161	20
	Seasons, natural rhythms	9.5	8.08	0.0118	29
	Jogging, Nordic walking	4.6	5.17	0.0089	36
	Being active, doing sports	5.7	6.47	0.0089	37
	Working	6.1	6.94	0.0088	38
	Consciously perceiving	5.3	9.14	0.0058	59
	Mountaineering, climbing	6.1	10.81	0.0057	62
Relationships	Beauty	36.6	3.59	0.1020	1
	Naturalness, nature	31.3	4.17	0.0750	2
	Tranquility	23.3	4.74	0.0491	4
	Place attachment, feeling at home	17.2	4.53	0.0379	7
	Unspoiltness, integrity	16.0	4.36	0.0368	8
	Recreation, relaxation	19.1	5.40	0.0353	10
	Green	9.5	3.48	0.0274	11
	Diversity, variedness	7.3	3.05	0.0238	13
	Good air	13.0	5.62	0.0231	14
	Space for doing and experiencing things	10.7	4.79	0.0223	15

Table 5.

Differences in responses from three respondent types: residents, farmers, and visitors. Analysis for 20 items with highest salience, ecosystem service types, landscape value types, and subcategories of cultural ecosystem services as well as landscape values 'relationships'. Values are given only for those cases with highly significant differences (p ≤ 0.001) in the comparison across all groups. Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent group who mentioned the corresponding item(s) (see Tables A.2 and A.3); standardized residuals are indicated in brackets (n = 262).

		Residents	Farmers	Visitors	x^2
		% of respondents who mentioned item(s) (standardized residuals)			
Items with highest salience	Place attachment, feeling at home	15.0 (− 0.6)	42.9 (+ 4.0)	6.0 (− 2.2)	25.880
	Unspoiltness, integrity	7.2 (− 2.7)	21.4 (− 0.9)	32.8 (+ 3.4)	23.851
	Recreation, relaxation	13.1 (− 1.7)	14.3 (− 0.7)	35.8 (+ 3.1)	16.362
	Cultivating	2.6 (− 2.8)	50.0 (+ 8.5)	0.0 (− 2,5)	95.222
Provisioning ecosystem services		12.4 (− 0.9)	35.7 (+ 3.4)	9.0 (− 1.3)	16.597
Subcategories of cultural ecosystem services	Sense of place	66.0 (− 1.2)	95.2 (+ 1.6)	80.6 (+ 0.6)	16.588
Landscape values 'relationships', subcategories	Predominantly material relationships	9.2 (− 1.3)	42.9 (+ 5.4)	3.0 (− 2.3)	41.112

Table 6.

Differences between responses from the four study areas. Analysis for 20 items with highest salience, ecosystem service types, and landscape value types. Values are given only for those cases with highly significant differences ($p \leq 0.001$) in the comparison across all groups. Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent group who mentioned the corresponding item(s); standardized residuals are indicated in brackets (n = 262).

		Freiburg/Black Forest	**Swabian Alb**	**Upper Lusatia**	**Hohe Tauern**	**x^2**
Items with highest salience	Beauty	11.4 (− 2.5)	25.8 (− 1.5)	47.6 (+ 1.7)	45.5 (+ 1.3)	19.888
	Naturalness, nature	17.1 (− 1.5)	34.8 (+ 0.5)	19.0 (− 2.0)	48.1 (+ 2.6)	19.563
	Mountains	42.9 (+ 2.7)	9.1 (− 2.2)	4.8 (−3.3)	41.6 (+ 3.7)	47.363
	Tranquility	20.0 (− 0.4)	16.7 (− 1.1)	10.7 (− 2.4)	44.2 (+ 3.8)	28.039
	Hiking	48.6 (+ 2.0)	9.1 (− 3.1)	7.1 (− 3.8)	64.9 (+ 5.6)	84.888
	Place attachment, feeling at home	2.9 (− 2.0)	6.1 (− 2.2)	14.3 (− 0.6)	36.4 (+ 4.1)	31.198
	Unspoiltness, integrity	0.0 (− 2.4)	19.7 (+ 0.7)	2.4 (− 3.1)	35.1 (+ 4.2)	39.693
	Water bodies	14.3 (+ 0.7)	4.5 (− 1.5)	21.4 (+ 3.2)	1.3 (− 2.5)	20.970
	Recreation, relaxation	8.6 (− 1.4)	9.1 (− 1.9)	17.9 (− 0.3)	33.8 (+ 2.9)	17.604
	Diversity, variedness	5.7 (− 1.2)	7.6 (− 1.2)	0.0 (− 3.3)	35.1 (+ 5.4)	49.131
	Walking	31.4 (+ 2.4)	3.0 (− 2.5)	3.6 (− 2.7)	31.2 (+ 3.6)	38.640
	Views	11.4 (+ 0.1)	4.5 (− 1.5)	0.0 (− 3.3)	27.3 (+ 4.5)	34.871
	Cultivating	0.0 (− 1.8)	1.5 (− 2.1)	0.0 (− 2.8)	31.2 (+ 6.1)	59.204
Ecosystem service types	Provisioning services[1]	8.6 (− 1.0)	4.5 (− 2.2)	8.3 (− 1.6)	35.1 (+ 4.4)	33.530
	Regulating services[2]	5.7 (− 1.2)	7.6 (− 1.2)	0.0 (− 3.3)	35.1 (+ 5.4)	49.131
Landscape value types	Forms[3]	88.6 (+ 1.6)	68.2 (+ 0.2)	39.3 (− 3.0)	83.1 (+ 1.8)	44.874

		Freiburg/Black Forest	Swabian Alb	Upper Lusatia	Hohe Tauern	x^2
	Practices[4]	71.4 (+ 1.1)	30.3 (− 2.9)	32.1 (− 3.0)	100.0 (+ 5.0)	101.352

1 Respondents who mentioned at least one out of the respective five items, see Table A.2.

2 Respondents who mentioned 'good air'.

3 Respondents who mentioned at least one out of the respective 32 items, see Table A.3.

4 Respondents who mentioned at least one out of the respective 20 items, see Table A.3.

Table 7.

Differences between responses from the four study areas. Analysis for subcategories of cultural ecosystem services and landscape values type 'relationships'. Values are given only for those cases with highly significant differences ($p \leq 0.001$) in the comparison across all groups. Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent groups who mentioned the corresponding item(s) (see Tables A.2 and A.3); standardized residuals are indicated in brackets (n = 262).

		Freiburg/Black Forest	Swabian Alb	Upper Lusatia	Hohe Tauern	x^2
Cultural ecosystem services	Aesthetic values[1]	22.9 (− 2.3)	33.3 (− 2.0)	51.2 (+ 0.1)	76.6 (+ 3.2)	39.513
	Sense of place[2]	62.9 (− 0.8)	77.3 (+ 0.3)	54.8 (− 2.1)	98.7 (+ 2.5)	43.648
	Recreation and ecotourism[3]	60.0 (+ 0.5)	33.3 (− 2.3)	36.9 (− 2.1)	87.0 (+ 4.0)	55.487
	Inspirational values[4]	0,0 (− 1.7)	1.5 (− 1.9)	2.4 (− 1.9)	24.7 (+ 4.9)	37.751
Landscape values type 'relation-ships', sub-categories	Predominantly immaterial relationships[5]	25.7 (− 2.5)	36.4 (− 2.2)	50.0 (− 0.9)	97.4 (+ 4.7)	78.514
	Predominantly material relationships[6]	5.7 (− 1.2)	7.6 (− 1.2)	3.6 (− 2.4)	31.2 (+ 4.4)	32.485
	Socio-cultural relationships[7]	14.3 (− 0.1)	6.1 (− 1.9)	3.6 (− 2.7)	35.1 (+ 4.6)	37.302
	Relationships based on sensory perceptions[8]	17.1 (+ 0.2)	10.6 (− 1.0)	0.0 (− 3.6)	36.4 (+ 4.6)	41.945
	Relationships based on landscape properties[9]	74.3 (+ 0.4)	75.8 (+ 0.7)	40.5 (− 3.1)	90.9 (+ 2.4)	50.819

1 Respondents who mentioned at least one out of the respective nine items.

2 Respondents who mentioned at least one out of the respective 26 items.

3 Respondents who mentioned at least one out of the respective 17 items.

4 Respondents who mentioned at least one out of the respective three items.

5 Respondents who mentioned at least one out of the respective 24 items.

6 Respondents who mentioned at least one out of the respective six items.

7 Respondents who mentioned at least one out of the respective three items.

8 Respondents who mentioned at least one out of the respective five items.

9 Respondents who mentioned at least one out of the respective 15 items.

ANNEX

Table A.1: Sample overview.

		Freiburg / Black Forest	Upper Lusatia	Swabian Alb	Hohe Tauern	Total
N		35	84	66	77	262
Age	≤19 years (%)	0.0	3.6	1.5	0.0	1.5
	20-29 years (%)	25.7	10.7	13.6	13.0	14.1
	30-39 years (%)	0.0	17.9	15.2	6.5	11.5
	40-49 years (%)	11.4	29.8	28.8	22.1	24.8
	50-59 years (%)	28.6	20.2	18.2	19.5	20.6
	60-69 years (%)	22.9	10.7	18.2	35.1	21.4
	70-79 years (%)	11.4	6.0	4.5	2.6	5.3
	80-89 years (%)	0.0	1.2	0.0	1.3	0.8
Sex	Female (%)	54.7	51.2	60.6	57.1	54.6
	Male (%)	54.3	48.8	39.4	42.9	45.4
Type	Resident (%)	100.0	82.1	34.8	33.8	58.4
	Farmer (%)	0.0	0.0	25.8	32.5	16.0
	Visitor (%)	0.0	17.9	39.4	33.8	25.6
Interview location	In open landscape (%)	48.6	48.8	0.0	0.0	22.1
	Within built environment (%)	51.4	51.2	0.0	0.0	23.3
	Not applicable (%)	0.0	0.0	100.0	100.0	54.6

Table A.2: List of all items mentioned by the respondents and their assignment to the ecosystem services types 'provisioning', 'regulating' and 'cultural' as well as to the subcategories of 'cultural ecosystem services'.

Item	Ecosystem services type	Subcategory of 'cultural ecosystem services' type
Accessibility	Not assigned	-
Alb escarpment	Not assigned	-
Angling, hunting	Cultural	Recreation and ecotourism
Animals	Not assigned	-
Arable land	Not assigned	-
Beauty	Cultural	Aesthetic values
Being active, doing sports	Cultural	Recreation and ecotourism
Biological diversity	Not assigned	-
Capaciousness, vastness	Cultural	Sense of place
Castles	Cultural	Cultural heritage values
Colors	Cultural	Aesthetic values
Comfort, consolation	Cultural	Sense of place
Life balance, stress reduction	Cultural	Recreation and ecotourism
Consciously perceiving	Cultural	Inspirational services
Contrasts	Cultural	Aesthetic values
Cultivating	Cultural	Not assigned
Cultural life, cultural offers	Cultural	Not assigned
Cycling	Cultural	Recreation and ecotourism
Diversity, variedness	Cultural	Sense of place
Earth	Not assigned	-
Enjoyment	Cultural	Sense of place
Experiences, events, impressions	Cultural	Sense of place
Familiarity	Cultural	Sense of place
Family	Not assigned	-
Felicity, fulfilment	Cultural	Sense of place
Flat topography	Not assigned	-
Flowers	Cultural	Aesthetic values
Forest, woodland	Not assigned	-
Freedom, independence	Cultural	Sense of place
Garden	Not assigned	-
Gathering (berries, mushrooms etc.)	Provisioning	-
Good air	Regulating	-
Good for the soul	Cultural	Sense of place
Good place to live	Provisioning	-
Good social relations	Not assigned	-
Good trails and other infrastructure	Not assigned	-
Good weather or climate	Not assigned	-
Green	Cultural	Sense of place
Harmony, consonance with nature	Cultural	Sense of place
Health, fitness	Cultural	Recreation and ecotourism
Healthy and good food	Provisioning	-
Heathland	Not assigned	-
Hiking	Cultural	Recreation and ecotourism

Item	Ecosystem services type	Subcategory of 'cultural ecosystem services' type
Hills	Not assigned	-
Income	Not assigned	-
Inspiration, stimulation	Cultural	Inspirational values
Jogging, Nordic walking	Cultural	Recreation and ecotourism
Joy	Cultural	Sense of place
Land ownership	Not assigned	-
Learning	Cultural	Educational values
Low-impact tourism	Cultural	Recreation and ecotourism
Meadows, grassland	Not assigned	-
Memories, history	Cultural	Cultural heritage values
Mountaineering, climbing	Cultural	Recreation and ecotourism
Mountains	Not assigned	-
Naturalness, nature	Cultural	Sense of place
Observing	Cultural	Educational values
Orchard	Not assigned	-
Other activities (e.g., horse riding)	Cultural	Recreation and ecotourism
Particular place: Black Forest	Not assigned	-
Particular place: military training ground	Not assigned	-
Particular place: mountain	Not assigned	-
Particular place: other	Not assigned	-
Particular place: valley, lowland	Not assigned	-
Particular place: water body	Not assigned	-
Peace	Cultural	Sense of place
Place attachment, feeling at home	Cultural	Sense of place
Plants	Not assigned	-
Playing	Cultural	Recreation and ecotourism
Recreation, relaxation	Cultural	Recreation and ecotourism
Rocks	Not assigned	-
Rural character	Not assigned	-
Safety	Cultural	Sense of place
Satisfaction, contentedness	Cultural	Sense of place
Scents	Cultural	Aesthetic values
Seasonal mountain pastures	Not assigned	-
Seasons, natural rhythms	Not assigned	-
Self-supply (of foods or materials)	Provisioning	-
Sensory perception	Cultural	Aesthetic values
Serenity	Cultural	Sense of place
Shrubs	Not assigned	-
Singularity, impressiveness	Cultural	Sense of place
Skiing	Cultural	Recreation and ecotourism
Sky	Not assigned	-
Solitude	Cultural	Sense of place
Sounds	Cultural	Aesthetic values
Space for children	Cultural	Sense of place

Item	Ecosystem services type	Subcategory of 'cultural ecosystem services' type
Space for doing and experiencing things	Cultural	Sense of place
Spirituality	Cultural	Spiritual / religious values
Strengthening, energizing	Cultural	Recreation and ecotourism
Strenuous, challenging	Cultural	Sense of place
Sun	Not assigned	-
Supply (of foods or materials)	Provisioning	-
Sustainable use	Not assigned	-
Swimming, canoeing, water sports	Cultural	Recreation and ecotourism
Taking pictures, drawing, painting	Cultural	Inspirational values
Tourism	Cultural	Recreation and ecotourism
Tranquility	Cultural	Sense of place
Trees	Not assigned	-
Trimmedness	Cultural	Aesthetic values
Unspoiltness, integrity	Cultural	Sense of place
Valley	Not assigned	-
Views	Cultural	Aesthetic values
Vineyard	Not assigned	-
Walking	Cultural	Recreation and ecotourism
Warmth	Cultural	Sense of place
Water bodies	Not assigned	-
Weather	Not assigned	-
Working	Not assigned	-

Table A.3: List of all items mentioned by the respondents and their assignment to the landscape values types 'forms', 'practices (including processes)', and 'relationships' as well as to the subcategories of 'relationships'.

Item	Landscape values type	Subcategory of 'relationships' type
Accessibility	Relationships	Based on landscape properties
Alb escarpment	Forms	-
Angling, hunting	Practices	-
Animals	Forms	-
Arable land	Forms	-
Beauty	Relationships	Based on landscape properties
Being active, doing sports	Practices	-
Biological diversity	Forms	-
Capaciousness, vastness	Relationships	Based on landscape properties
Castles	Forms	-
Colors	Relationships	Based on sensory perceptions
Comfort, consolation	Relationships	Predominantly immaterial
Life balance, stress reduction	Relationships	Predominantly immaterial
Consciously perceiving	Practices	-
Contrasts	Relationships	Based on landscape properties
Cultivating	Practices	-
Cultural life, cultural offers	Relationships	Socio-cultural
Cycling	Practices	-
Diversity, variedness	Relationships	Based on landscape properties
Earth	Forms	-
Enjoyment	Relationships	Predominantly immaterial
Experiences, events, impressions	Relationships	Predominantly immaterial
Familiarity	Relationships	Based on landscape properties
Family	Relationships	Socio-cultural
Felicity, fulfilment	Relationships	Predominantly immaterial
Flat topography	Forms	-
Flowers	Forms	-
Forest, woodland	Forms	-
Freedom, independence	Relationships	Predominantly immaterial
Garden	Forms	-
Gathering (berries, mushrooms etc.)	Practices	-
Good air	Relationships	Based on landscape properties
Good for the soul	Relationships	Predominantly immaterial
Good place to live	Relationships	Predominantly material
Good social relations	Relationships	Socio-cultural
Good trails and other infrastructure	Forms	-
Good weather or climate	Relationships	Based on landscape properties
Green	Relationships	Based on landscape properties
Harmony, consonance with nature	Relationships	Predominantly immaterial
Health, fitness	Relationships	Predominantly immaterial
Healthy and good food	Relationships	Predominantly material
Heathland	Forms	-
Hiking	Practices	-

Item	Landscape values type	Subcategory of 'relationships' type
Hills	Forms	-

Item	Landscape values type	Subcategory of 'relationships' type
Income	Relationships	Predominantly material
Inspiration, stimulation	Relationships	Predominantly immaterial
Jogging, Nordic walking	Practices	-
Joy	Relationships	Predominantly immaterial
Land ownership	Relationships	Predominantly material
Learning	Practices	-
Low-impact tourism	Relationships	Not assigned
Meadows, grassland	Forms	-
Memories, history	Relationships	Predominantly immaterial
Mountaineering, climbing	Practices	-
Mountains	Forms	-
Naturalness, nature	Relationships	Based on landscape properties
Observing	Practices	-
Orchard	Forms	-
Other activities (e.g., horse riding)	Practices	-
Particular place: Black Forest	Forms	-
Particular place: military training ground	Forms	-
Particular place: mountain	Forms	-
Particular place: other	Forms	-
Particular place: valley, lowland	Forms	-
Particular place: water body	Forms	-
Peace	Relationships	Predominantly immaterial
Place attachment, feeling at home	Relationships	Predominantly immaterial
Plants	Forms	-
Playing	Practices	-
Recreation, relaxation	Relationships	Predominantly immaterial
Rocks	Forms	-
Rural character	Relationships	Based on landscape properties
Safety	Relationships	Predominantly immaterial
Satisfaction, contentedness	Relationships	Predominantly immaterial
Scents	Relationships	Based on sensory perceptions
Seasonal mountain pastures	Forms	-
Seasons, natural rhythms	Practices	-
Self-supply (of foods or materials)	Relationships	Predominantly material
Sensory perception	Relationships	Based on sensory perceptions
Serenity	Relationships	Predominantly immaterial
Shrubs	Forms	-
Singularity, impressiveness	Relationships	Based on landscape properties
Skiing	Practices	-
Sky	Forms	-
Solitude	Relationships	Based on landscape properties
Sounds	Relationships	Based on sensory perceptions
Space for children	Relationships	Predominantly immaterial

Item	Landscape values type	Subcategory of 'relationships' type
Space for doing and experiencing things	Relationships	Predominantly immaterial
Spirituality	Relationships	Predominantly immaterial
Strengthening, energizing	Relationships	Predominantly immaterial
Strenuous, challenging	Relationships	Predominantly immaterial
Sun	Forms	-
Supply (of foods or materials)	Relationships	Predominantly material
Sustainable use	Relationships	Not assigned
Swimming, canoeing, water sports	Practices	-
Taking pictures, drawing, painting	Practices	-
Tourism	Relationships	Not assigned
Tranquility	Relationships	Based on landscape properties
Trees	Forms	-
Trimmedness	Relationships	Based on landscape properties
Unspoiltness, integrity	Relationships	Based on landscape properties
Valley	Forms	-
Views	Relationships	Based on sensory perceptions
Vineyard	Forms	-
Walking	Practices	-
Warmth	Relationships	Predominantly immaterial
Water bodies	Forms	-
Weather	Practices	-
Working	Practices	-

Table A.4: Difference in age, sex, informant type, site, and interview location for 20 items with highest salience. Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent group who mentioned the item. For significant differences between respondent groups, standardized residuals are indicated in brackets (n=262).

		Beauty	Naturalness, nature	Mountains	Tranquility	Forest, woodland	Hiking	Place attachment, feeling at home
Salience rank		1	2	3	4	5	6	7
Age	< 30 years	39.0	36.6	17.1	17.1	22.0 (+0.6)	34.1	12.2
	30-49 years	29.5	25.3	17.9	20.0	9.5 (-1.9)	22.1	18.9
	50-69 years	41.8	34.5	26.4	29.1	20.9 (+0.7)	33.6	17.3
	≥ 70 years	37.5	31.2	25.0	18.8	37.5 (+1.8)	43.8	18.8
	χ^2	3.478 (ns)	2.682 (ns)	2.831 (ns)	3.720 (ns)	9.891 *	5.270 (ns)	0.953 (ns)
Sex	Female	43.4 (+1.3)	32.2	23.1	23.8	14.7	29.4	15.4
	Male	28.6 (-1.5)	30.3	20.2	22.7	21.8	31.1	19.3
	χ^2	6.116 *	0.111 (ns)	0.323 (ns)	0.043 (ns)	2.264 (ns)	0.091 (ns)	0.710 (ns)
Type	Resident	35.3	26.8 (-1.0)	22.2	18.3 (-1.3)	17.0	26.8	15.0 (-0.6)
	Farmer	35.7	26.2 (- 0.6)	14.3	23.8 (-0.1)	26.2	28.6	42.9 (+4.0)
	Visitor	40.3	44.8 (+2.0)	25.4	34.3 (+1.9)	14.9	38.8	6.0 (-2.2)
	χ^2	0.521 (ns)	7.611 *	1.911 (ns)	6.709 *	2.449 (ns)	3.250 (ns)	25.880 ***
Site	Freiburg / B. F.	11.4 (-2.5)	17.1 (-1.5)	42.9 (+2.7)	20.0 (-0.4)	28.6 (+1.5)	48.6 (+2.0)	2.9 (-2.0)
	Swabian Alb	25.8 (-1.5)	34.8 (+0.5)	9.1 (-2.2)	16.7 (-1.1)	25.8 (+1.5)	9.1 (-3.1)	6.1 (-2.2)
	Upper Lusatia	47.6 (+1.7)	19.0 (-2.0)	4.8 (-3.3)	10.7 (-2.4)	10.7 (-1.6)	7.1 (-3.8)	14.3 (-0.6)
	Hohe Tauern	45.5 (+1.3)	48.1 (+2.6)	41.6 (+3.7)	44.2 (+3.8)	14.3 (-0.8)	64.9 (+5.6)	36.4 (+4.1)
	χ^2	19.888 ***	19.563 ***	47.363 ***	28.039 ***	9.105 *	84.888 ***	31.198 ***
Interview location[1]	In open landscape	37.9	22.4	6.9 (-1.7)	17.2	15.5	22.4	6.9
	Within built environment	36.1	14.8	24.6 (+1.7)	9.8	16.4	16.4	14.8
	χ^2	0.044 (ns)	1.158 (ns)	6.937 **	1.401 (ns)	0.017 (ns)	0.691 (ns)	1.886 (ns)

[1] n=119

(Table A.4 continued)

		Unspoiltness, integrity	Water bodies	Recreation, relaxation	Green	Cycling	Diversity, variedness	Good air
Salience rank		8	9	10	11	12	13	14
Age	< 30 years	4.9 (-1.8)	9.8	19.5	12.2	4.9	12.2	4.9
	30-49 years	17.9 (+0.5)	9.5	24.2	9.5	4.2	10.5	4.2
	50-69 years	20.9 (+1.3)	11.8	15.5	9.1	10.9	16.4	10.9
	≥ 70 years	0.0 (-1.6)	6.2	12.5	6.2	6.2	6.2	6.2
	χ^2	9.033 *	0.642 (ns)	3.009 (ns)	0.562 (ns)	3.861 (ns)	2.286 (ns)	3.861 (ns)
Sex	Female	17.5	11.2	19.6	11.2	5.6	11.9	5.6
	Male	14.3	9.2	18.5	7.6	9.2	14.3	9.2
	χ^2	0.493 (ns)	0.266 (ns)	0.050 (ns)	0.989 (ns)	1.286 (ns)	0.331 (ns)	1.286 (ns)
Type	Resident	7.2 (-2.7)	15.7 (+2.1)	13.1 (-1.7)	8.5	3.9 (-1.5)	9.2 (-1.3)	3.9 (-1.5)
	Farmer	21.4 (-0.9)	0.0 (-2.1)	14.3 (-0.7)	11.9	14.3 (+1.7)	9.5 (-0.6)	14.3 (+1.7)
	Visitor	32.8 (+3.4)	4.5 (-1.5)	35.8 (+3.1)	10.4	10.4 (+1.0)	23.9 (+2.5)	10.4 (+1.0)
	χ^2	23.851 ***	12.080 **	16.362 ***	0.529 (ns)	6.630 **	9.481 **	6.630 **
Site	Freiburg / B. F.	0.0 (-2.4)	14.3 (+0.7)	8.6 (-1.4)	20.0	8.6	5.7 (-1.2)	8.6
	Swabian Alb	19.7 (+0.7)	4.5 (-1.5)	9.1 (-1.9)	12.1	13.6	7.6 (-1.2)	13.6
	Upper Lusatia	2.4 (-3.1)	21.4 (+3.2)	17.9 (-0.3)	4.8	3.6	0.0 (-3.3)	3.6
	Hohe Tauern	35.1 (+4.2)	1.3 (-2.5)	33.8 (+2.9)	7.8	5.2	35.1 (+5.4)	5.2
	χ^2	39.693 ***	20.970 ***	17.604 ***	7.440 (ns)	6.267 (ns)	49.131 ***	6.267 (ns)
Interview location[1]	In open landscape	0.0	13.8	25.9 (+2.1)	6.9	5.2	3.4	5.2
	Within built environment	3.3	24.6	4.9 (-2.0)	11.5	4.9	0.0	4.9
	χ^2	1.934 (ns)	2.223 (ns)	10.159 ***	0.743 (ns)	0.004 (ns)	2.139 (ns)	0.004 (ns)

[1] n=119

		Space for doing and experiencing things	Walking	Trees	Views	Capaciousness, vastness	Cultivating
Salience rank		15	15	17	18	19	20
Age	< 30 years	17.1	14.6	7.3	14.6	14.6	9.8
	30-49 years	11.6	10.5	7.4	5.3	6.3	9.5
	50-69 years	6.4	19.1	5.5	11.8	7.3	10.0
	≥ 70 years	18.8	18.8	0.0	25.0	12.5	6.2
	χ^2	5.075 (ns)	3.057 (ns)	1.491 (ns)	7.179 (ns)	3.140 (ns)	0.230 (ns)
Sex	Female	9.1	20.3 (+1.5)	5.6	15.4 (+1.7)	11.9 (+1.4)	7.7
	Male	12.6	9.2 (-1.7)	6.7	5.0 (-1.9)	4.2 (-1.6)	11.8)
	χ^2	0.840 (ns)	6.115 [*]	0.144 (ns)	7.279 [**]	4.989 [*]	1.248 (ns)
Type	Resident	11.1	16.3	5.2	8.5	5.2 (-1.4)	2.6 (-2.8)
	Farmer	2.4	4.8	11.9	7.1	7.1 (-0.3)	50.0 (+8.5)
	Visitor	14.9	19.4	4.5	17.9	16.4 (+2.3)	0.0 (-2.5)
	χ^2	4.326 (ns)	4.605 (ns)	2.978 (ns)	4.984 (ns)	7.686 [*]	95.222 [***]
Site	Freiburg / B. F.	2.9	31.4 (+2.4)	11.4	11.4 (+0.1)	11.4	0.0 (-1.8)
	Swabian Alb	12.1	3.0 (-2.5)	10.6	4.5 (-1.5)	10.6	1.5 (-2.1)
	Upper Lusatia	9.5	3.6 (-2.7)	2.4	0.0 (-3.0)	2.4	0.0 (-2.8)
	Hohe Tauern	14.3	31.2 (+3.6)	3.9	27.3 (+4.5)	11.7	31.2 (+6.1)
	χ^2	3.554 (ns)	38.640 [***]	6.749 (ns)	34.871 [***]	5.874 (ns)	59.204 [***]
Interview location[1]	In open landscape	13.8 (+1.7)	15.5	5.2	6.9 (+1.5)	96.6	0.0
	Within built environment	1.6 (-1.7)	8.2	4.9	0.0 (-1.4)	93.4	0.0
	χ^2	6.282 [**]	1.535 (ns)	0.004 (ns)	4.353 [*]	0.600 (ns)	-

[1] n=119

40

Table A.5: Difference in age, sex, informant type, site, and interview location for ecosystem services types. Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent group who mentioned the corresponding items (see Table A.2). For significant differences between respondent groups, standardized residuals are indicated in brackets (n=262).

		Provisioning services[1]	Regulating services[2]	Cultural services[3]
Age	< 30 years	12.2	12.2	97.6
	30-49 years	16.8	10.5	93.7
	50-69 years	16.4	16.4	91.8
	≥ 70 years	6.2	6.2	93.8
	χ^2	1.589 (ns)	2.286 (ns)	1.634 (ns)
Sex	Female	14.0	14.3	94.4
	Male	16.8	11.9	92.4
	χ^2	0.399 (ns)	0.331 (ns)	0.415 (ns)
Type	Resident	12.4 (-0.9)	9.2 (-1.3)	90.8
	Farmer	37.5 (+3.4)	9.5 (-0.6)	95.2
	Visitor	9.0 (-1.3)	23.9 (+2.5)	98.5
	χ^2	16.597 ***	9.481 **	4.749 (ns)
Site	Freiburg / B. F.	8.6 (-1.0)	5.7 (-1.2)	88.6 (-0.3)
	Swabian Alb	4.5 (-2.2)	7.6 (-1.2)	93.9 (0,0)
	Upper Lusatia	8.3 (-1.6)	0.0 (-3.3)	89.3 (-0.4)
	Hohe Tauern	35.1 (+4.4)	35.1 (+5.4)	100.0 (+0.6)
	χ^2	33.530 ***	49.131 ***	9.243 *
Interview location[4]	In open landscape	6.9	3.4	94.8
	Within built environment	9.8	0.0	83.6
	χ^2	0.334 (ns)	2.139 (ns)	3.847 (ns)

[1] Respondents who mentioned at least one out of the respective five items
[2] Respondents who mentioned 'good air'
[3] Respondents who mentioned at least one out of the respective 62 items
[4] n=119

Table A.6: Differences in age, sex, informant type, site, and interview location for landscape values types. Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent group who mentioned the corresponding items (see Table A.3). For significant differences between respondent groups, standardized residuals are indicated in brackets (n=262).

		Forms[1]	Practices (including processes)[2]	Relationships[3]
Age	< 30 years	68.3	70.7	92.7
	30-49 years	56.8	47.4	92.6
	50-69 years	73.6	60.0	92.7
	≥ 70 years	62.5	56.29	87.5
	χ^2	6.595 (ns)	7.150 (ns)	0.573 (ns)
Sex	Female	67.8	55.9	93.0
	Male	63.9	58.0	91.6
	χ^2	0.456 (ns)	0.110 (ns)	0.183 (ns)
Type	Resident	60.8 (-0.8)	52.9	87.6 (-0.6)
	Farmer	83.3 (+1.4)	64.3	97.6 (+0.4)
	Visitor	67.2 (+0.1)	61.2	100.0 (+0.7)
	χ^2	7.522 *	2.415 (ns)	12.148 **
Site	Freiburg / B. F.	88.6 (+1.6)	71.4 (+1.1)	88.6 (-0.2)
	Swabian Alb	68.2 (+0.2)	30.3 (-2.9)	92.4 (0.0)
	Upper Lusatia	39.3 (-3.0)	32.1 (-3.0)	86.9 (-0.5)
	Hohe Tauern	83.1 (+1.8)	100.0 (+5.0)	100.0 (+0.7)
	χ^2	44.874 ***	101.352 ***	10.633 *
Interview location[4]	In open landscape	46.6	60.3 (+1.9)	94.8 (+0.6)
	Within built environment	60.7	27.9 (-1.9)	80.3 (-0.6)
	χ^2	2.379 (ns)	12.745 ***	5.674 *

[1] Respondents who mentioned at least one out of the respective 32 items
[2] Respondents who mentioned at least one out of the respective 20 items
[3] Respondents who mentioned at least one out of the respective 57 items
[4] n=119

Table A.7: Difference in age, sex, informant type, site, and interview location for subcategories of cultural ecosystem services. Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent group who mentioned the corresponding items (see Table A.2). For significant differences between respondent groups, standardized residuals are indicated in brackets (n=262).

		Aesthetic values[1]	Sense of place[2]	Recreation and eco-tourism[3]	Cultural heritage values[4]	Inspir-ational values[5]	Spiritual / religious values[6]	Educa-tional values[7]
Age	< 30 years	43.9	73.2	68.3	2.4	4.9 (-0.8)	0.0	7.3
	30-49 years	43.2	71.6	51.6	7.4	3.2 (-1.8)	2.1	3.2
	50-69 years	56.4	77.3	50.9	6.4	14.5 (+2.2)	2.7	6.4
	≥ 70 years	68.8	75.0	50.0	0,0	6.2 (-0.3)	0.0	0.0
	χ^2	6.046 (ns)	0.910 (ns)	4.116	2.350 (ns)	9.552 *	1.523 (ns)	2.432 (ns)
Sex	Female	58.0 (+1.3)	76.2	51.7	3.5	7.7	1.4	5.9
	Male	41.2 (-1.4)	72.3	56.3	8.4	9.2	2.5	4.2
	χ^2	7.390 *	0.534 (ns)	0.542 (ns)	2.897 (ns)	0.203 (ns)	0.437(ns)	0.392 (ns)
Type	Resident	44.4	66.0 (-1.2)	49.0 (-0.8)	3.3 (-1.3)	4.6 (-1.6)	0.0 (-1.7)	1.3 (-2.0)
	Farmer	57.1	95.2 (+1.6)	50.0 (-0.3)	16.7 (+3.0)	7.1 (-0.3)	2.4 (+0.2)	7.1 (+0.6)
	Visitor	59.7	80.6 (+0.6)	67.2 (+1.5)	4.5 (-0.4)	17.9 (+0.7)	6.0 (+2.4)	11.9 (+2.6)
	χ^2	5.253 (ns)	16.588 ***	6.465 *	11.220 **	10.875 **	8.932 *	11.676 **
Site	Freiburg / B. F.	22.9 (-2.3)	62.9 (-0.8)	60.0 (+0.5)	0.0	0.0 (-1.7)	0.0	0.0
	Swabian Alb	33.3 (-2.0)	77.3 (+0.3)	33.3 (-2.3)	7.6	1.5 (-1.9)	1.5	0.0
	Upper Lusatia	51.2 (+0.1)	54.8 (-2.1)	39.6 (-2.1)	2.4	2.4 (-1.9)	0.0	1.2
	Hohe Tauern	76.6 (+3.2)	98.7 (+2.5)	87.0 (+4.0)	10.4	24.7 (+4.9)	5.2	15.6
	χ^2	39.513 ***	43.648 ***	55.487 ***	7.389 (ns)	37.751 ***	6.812 (ns)	n.a.
Interview location[8]	In open landscape	46.6	58.6	58.6 (+1.7)	3.4	3.4	0.0	1.7
	Within built environment	39.3	55.7	29.5 (-1.7)	0.0	0.0	0.0	0.0
	χ^2	0.631 (ns)	0.101 (ns)	10.242 **	2.139 (ns)	2.139 (ns)	-	1.061 (ns)

[1] Respondents who mentioned at least one out of the respective nine items
[2] Respondents who mentioned at least one out of the respective 26 items
[3] Respondents who mentioned at least one out of the respective 17 items
[4] Respondents who mentioned at least one out of the respective two items
[5] Respondents who mentioned at least one out of the respective three items
[6] Item 'spirituality'
[7] Respondents who mentioned at least one out of the respective two items
[8] n=119

Table A.8: Difference in age, sex, informant type, place, and interview location for subcategories of landscape values type 'relationships' (see Annex 2). Unless otherwise indicated, numbers refer to the percentage of persons in the respective respondent group who mentioned the items (see Table A.3). For significant differences between respondent groups, standardized residuals are indicated in brackets (n=262).

		Predominantly immaterial relationships[1]	Predominantly material relationships[2]	Socio-cultural relationships[3]	Relationships based on sensory perceptions[4]	Relationships based on landscape properties[5]
Age	< 30 years	48.8	9.8	12.2	14.6	73.2
	30-49 years	61.1	16.8	13.7	9.5	66.3
	50-69 years	54.5	11.8	16.4	20.0	69.1
	$\geq$ 70 years	75.0	6.2	18.8	25.0	68.8
	χ^2	4.151 (ns)	2.405 (ns)	0.721 (ns)	5.414 (ns)	0.640 (ns)
Sex	Female	55.9	11.2	18.2	19.6	74.1 (+0.8)
	Male	58.8	15.1	10.9	10.9	62.2 (-0.9)
	χ^2	0.220 (ns)	0.892 (ns)	2.700 (ns)	3.687 (ns)	4.307 *
Type	Resident	48.4 (-1.5)	9.2 (-1.3)	12.4	11.8	61.4 (-1.1)
	Farmer	69.0 (+1.0)	42.9 (+5.4)	19.0	16.7	76.2 (+0.6)
	Visitor	70.1 (+1.4)	3.0 (-2.3)	17.9	23.9	80.6 (+1.2)
	χ^2	11.878 **	41.112 ***	1.793 (ns)	5.221 (ns)	9.259 **
Site	Freiburg / B. F.	25.7 (-2.5)	5.7 (-1.2)	14.3 (-0.1)	17.1 (+0.2)	74.3 (+0.4)
	Swabian Alb	36.4 (-2.2)	7.6 (-1.2)	6.1 (-1.9)	10.6 (-1.0)	75.8 (+0.7)
	Upper Lusatia	50.0 (-0.9)	3.6 (-2.4)	3.6 (-2.7)	0.0 (-3.6)	40.5 (-3.1)
	Hohe Tauern	97.4 (+4.7)	31.2 (+4.4)	35.1 (+4.6)	36.4 (+4.6)	90.9 (+2.4)
	χ^2	78.514 ***	32.485 ***	37.302 ***	41.945 ***	50.819 ***
Interview location[6]	In open landscape	55.2 (+1.4)	1.7	10.3	10.3 (+1.8)	53.4
	Within built environment	31.1 (-1.4)	6.6	3.3	0.0 (-1.8)	47.5
	χ^2	7.007 *	1.725 (ns)	2.367 (ns)	6.645 **	0.415 (ns)

[1] Respondents who mentioned at least one out of the respective 24 items
[2] Respondents who mentioned at least one out of the respective six items
[3] Respondents who mentioned at least one out of the respective three items
[4] Respondents who mentioned at least one out of the respective five items
[5] Respondents who mentioned at least one out of the respective 15 items
[6] n=119