Perceived Wellbeing Effects of Ecosystems in Finland

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Abstract

Human recognition, valuation, and communication lie at the heart of ecosystem goods and services. We explore how the wellbeing effects of ecosystems are recognized and communicated based on data obtained from an information campaign to increase public awareness of the health and wellbeing benefits of rural nature areas in Finland. Interested members of the public from different backgrounds were asked to outline and publicly share short descriptions of their personal recommendations for improving their wellbeing through interacting with rural landscapes. The results indicate that a wide variety of ecosystem types and functions are perceived to be important for producing a range of wellbeing benefits through experiencing and multisensory observations of natural landscapes. The importance of cultural and experiential ecosystem services were highlighted while provisioning services received only minor attention, and regulating services were almost entirely unnoted.

Keywords Communication · Ecosystem services · Rural nature · Perceptions · Wellbeing · Common International Classification of Ecosystem Services · Finland

Introduction

The capacities of ecosystems to provide a range of goods and services for human populations have been increasingly acknowledged since the publication of the Millennium Ecosystem Assessment (MEA 2005) through various assessments and studies documenting ecosystem benefits, as well as increased awareness amongst environmental advocates and some alert policy-makers and members of the public (Seppelt *et al.* 2011; Spyra *et al.* 2019). Various frameworks have been developed to identify, classify, and evaluate ecosystem services accurately, and concepts such as the contribution of natural landscapes to human wellbeing have been suggested to capture the dynamics of human–nature relations in a more holistic manner (Jacobs *et al.* 2016; Ellis *et al.* 2019). One of the key standards is the Common International Classification of Ecosystem Services (CICES) (2019) that has been adopted as the basis for mapping of ecosystem

services under the European Union biodiversity strategy (Furman *et al.* 2018).

In some cases, ecosystem services – here defined broadly as benefits for human health and wellbeing provided by ecosystems – can be easily recognized through touch, smell, taste, sound, or visual appearance. In other cases, recognition is beyond direct human sensory capabilities and major uncertainties may remain, even after meticulous theoretical reasoning or advanced technical observation and measurement. Even seemingly simple assessments of nature’s health benefits may entail complications (Guidotti 2018). Enjoying wild berries such as bilberries (*Vaccinium myrtillus*) from boreal forests can be considered a straightforward example of a provisioning ecosystem service. These berries have been characterized as a ‘superfood’ in popular debate and their beneficial effects on human health have been convincingly documented (Yang and Kortensniemi 2015). However, there are risks attached to both gathering and consuming them. Picking berries carries a risk of getting lost in a forest, sustaining injuries, or having unwanted encounters with wildlife. Consuming berries that are infested with parasites such as *Echinococcus* can lead to severe health threats (Kern *et al.* 2017). Due to these potential risks, even perfectly safe berries can be falsely perceived as health risks. Such subjective perceptions of ecosystem disservices can have a considerable influence on ecosystem management, especially if combined with scaremongering in popular or social media (Lyytimäki 2014).

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Most of the research literature on ecosystem services and their valuation has focused on natural sciences and economics, but non-monetary valuations have recently gained more prominence (Seppelt *et al.* 2011; Ford *et al.* 2015; Acharya *et al.* 2019). Early ecosystem service studies focused primarily on conceptual issues and on assessing provisioning and regulating services (Vihervaara *et al.* 2010). Ecosystem services valuation work has tended to emphasize utility and market values, partly neglecting, for instance, the impact of natural landscapes on the psychological wellbeing of humans (Kumar and Kumar 2008; Keniger *et al.* 2013). These non-material values have traditionally been grouped under the term cultural ecosystem services and have received less scholarly attention, even though several important studies have been published (e.g., Chan *et al.* 2012; Fish *et al.* 2016; Dickinson and Hobbs 2017). Recently, methodological diversity has increased and new data sources have become available (Furman *et al.* 2018; Acharya *et al.* 2019).

Despite the development of various conceptual and operational frameworks – such as CICES – to identify and characterize ecosystem services considerable further research is still needed (Milcu *et al.* 2013; Fish *et al.* 2016; Costanza *et al.* 2017; Furman *et al.* 2018). Even with increasing interest in the socio-cultural preferences towards ecosystem services, the mechanisms through which people perceive that ecosystems provide benefits to wellbeing remain an understudied area. In particular, communication and interaction processes related to value pluralism pose a special challenge for the identification and assessment of ecosystem services (Jacobs *et al.* 2016).

We aim to fill in these research gaps by focusing on publicly shared communications describing personal perceptions of the wellbeing benefits of ecosystem services. The following questions guide our research:

- What kinds of benefits provided by rural nature are perceived as important and how they are experienced and communicated?
- What kinds of ecosystems and ecosystem services do people associate with perceived wellbeing benefits in the northern European context?
- How well does the current mainstream classification of ecosystem services (CICES) correspond with the people's perceptions? Does it take into account and communicate those ecosystem services appreciated by the people?

In the following section we describe the context of the study and the method of data collection. We then present our results followed by a discussion focusing on the implications for ecosystem service assessment and management, and finally, our conclusions and recommendations.

Context, Methods, and Materials

This study was carried out in Finland, a northern European country characterized by rapid industrialization during the late twentieth century, continuing urbanization, and an ageing population. Currently, 70.6% of the population lives in urban areas (Rehunen *et al.* 2018). Finnish cities are small and characterized by easy access to green areas. Significant ownership of second homes and summer cottages located in the countryside increase the possibilities for encounters with natural areas. The country has approximately 5.5 million inhabitants and about 2.2 million people regularly visit second homes in rural areas (Pitkänen and Strandell 2018). Over 600,000 Finns are forest owners, and the so-called 'everyman's right' allows free use of forests for all people, including the opportunity to pick berries or mushrooms, as long as they do not disturb anything.

Data were collected as part of the 'Joy from Nature' communication campaign that focused on the Finnish countryside. The campaign was funded by the Rural Policy Committee (RPC) and was one activity of the ecosystem services network operating under the RPC, with the aim of implementing the National Rural Policy Program for 2014–2020. The principal aim of the campaign was to disseminate science-based knowledge on rural ecosystem services and nature-based solutions, focusing in particular on health and wellbeing issues. The campaign was implemented through broad collaboration with various non-governmental organizations (NGO) and networks.

In addition to disseminating science-based knowledge, the campaign asked people to provide 'recipes,' that is, their own personal suggestions for gaining wellbeing effects from nature. People were asked to write down and share their 'best tips for enjoying the wellbeing benefits provided by rural nature.' The aim was to guide respondents to subjectively describe their ways of gaining wellbeing benefits from nature in a manner that other people could relate to. The survey was very simple. In addition to the above-mentioned open-ended question, background information about the name or pseudonym of the respondent, place of residence, age, and gender was requested. A link to the campaign web page providing additional information was included. It was not obligatory to provide background information.

Responses were collected during March–December 2016 through online and paper forms and through social media (using the hashtag #luontoresepti on Twitter). Answers were sought from different sectors of the public on various occasions, including the campaign website, invitations distributed by collaborating NGOs, and social media. Two special sub-campaigns were organized – one during the summer holiday season with the aim of collecting 'midsummer recipes,' and another during autumn and focusing on wintertime. Responses were also collected at a public fair directed at

gardeners and summer cottage owners (Helsinki Fair Centre, 7–10 April 2016; responses were requested from those passing by the fair section focusing on the bioeconomy), the meeting of a local association for the elderly (Etelä-Häme, May 2016), development events for the national association of biology and geography teachers (Helsinki, 19 November 2016; responses requested after a presentation focusing on ecosystem services), and a stakeholder event aimed at members of parliament and their assistants (Helsinki, 13 October 2016, in collaboration with the RPC).

The research material includes several limitations, as follows. It is not a representative sample of the population but instead a sample of individuals who consider nature important for their wellbeing and were willing to share their views. The specific Finnish context as an affluent Nordic welfare state with a sparse population and small cities providing easy access to green spaces, as well wide ownership of rural second homes, should be taken into account when making interpretations. The material does not give an objective or exhaustive overall picture of the types of ecosystem services that can be acquired from rural northern European environments. However, it can give insights into the subjective perceptions and valuations that govern what ecosystem services are considered important and how their benefits are experienced and communicated. The material represents a highly condensed, information-intensive form of communication.

We used qualitative content analysis to analyze the material by coding the text excerpts into different categories and sub-categories. In addition to the coding of the manifest content of the textual data, we undertook expert elicitation of the latent content (such as indirect or sarcastic expressions) in order to gain more in-depth understandings (Schreier 2012). In order to reduce the subjective bias, the coding and interpretations were made independently by two researchers. Disagreements between the coders were processed through iterative rounds of coding and clarification until consensus was reached. The interpretations were compared with insights from earlier findings on ecosystem service mapping and valuation and related studies focusing on the Finnish context (e.g., Salo 2015; Saastamoinen *et al.* 2014).

Four categorizations were created in order to draw an overall picture (Table 1). Contents related to these four categorizations and their classes were identified from each of the ‘recipes,’ which were coded accordingly. Typically, they contained mentions related to more than one of the classes under each category.

First, to gain an understanding of what kind of nature people associate with wellbeing benefits, we identified the ecosystem types directly mentioned or indirectly referred to. We took earlier categorizations used by national ecosystem service assessments as a starting point, and included new classes that did not fit into the initial categories based on the data (Saastamoinen *et al.* 2014).

Table 1 Coding scheme

Categories	Classes
Ecosystem types	Wetlands Sea Coastal areas Rivers, streams Urban nature Rural areas Gardens Lakes Forests Nature in general; undefined
Ecosystem services	48 classes of the CICES classification (see CICES 2019)
Health and wellbeing benefits	Physical Psychological Social Not applicable
Senses	Taste Smell Hearing Touch Sight Not applicable

Second, to understand what kinds of benefits people associate with ecosystems, we identified the types of ecosystem services referred to according to a classification by the Common International Classification of Ecosystem Services (CICES, version 4.3). It should be noted that the term ‘ecosystem service’ was purposefully left out in order to allow people to express their insights as openly as possible without the need to learn and use pre-defined technical vocabulary. Omitting the concept of ecosystem services was considered necessary because previous studies have criticized it as complicated to use, difficult to understand, and even unsuitable for communication with the general public (Niemelä *et al.* 2010; Lyytimäki 2014; Ruckelshaus *et al.* 2015).

Third, the health and wellbeing benefits were identified. In general, three types of health benefits have been emphasized: physical, psychological, and social (MEA 2005; Keniger *et al.* 2013; Puhakka *et al.* 2017). Examples of physical health benefits include positive physiological effects on blood pressure, hormone levels, the immune system, or disease prevention, as well as indirect physical benefits through exercise and activity in natural environments (Hanski 2014). Similarly, natural environments and ecosystems have been found to have positive psychological benefits through improving mood, self-esteem, concentration, and helping people to relax and recover from mental fatigue, as well as providing cognitive stimuli (Keniger *et al.* 2013). Finally, natural environments have a beneficial effect on health by

promoting social contact and interaction, and strengthening bonds between people (Maller 2009). These benefits are often overlapping. For example, physical exercise improves both physical and psychological health and can be done alone or in a group.

Fourth, we analyzed the ‘recipes’ for descriptions of how the benefits were experienced and which senses were needed to both recognize and experience the ecosystem services. We took an embodied perspective on human perception, which highlighted that human–environment connections are produced over time and through complex interplay between mind, body, culture, the built environment, and natural ecosystems, as our starting point (Raymond *et al.* 2018). Sight is often considered the most important human sense, but the sensory capabilities of the human eye have considerable limitations, especially at night-time (Lyytimäki 2013). Therefore, a multisensory approach to ecosystem services may be useful to better illuminate the full repertoire of ecosystem services. The analysis included the five classic senses (sight, hearing, touch, smell, and taste), even though several other senses exist (Stone *et al.* 2012). We grouped thermoreception, pressure, and proprioception (the sense of where body parts are relative to each other) under the sense of touch.

Results

Our data for this study includes 77 ‘recipes,’ and the average number of ecosystem services mentioned per ‘recipe’ was 1.6. They were short descriptions of the best ways to enjoy nature, most being one or two sentences long. Despite their brevity, they provided rich and highly variable material, including both detailed descriptions of specific actions or physical settings, and expressions of deep emotions and sensations related to encounters with nature. On several occasions potential respondents were more willing to discuss their experiences in person than to write them down. Respondents were informed that written answers may later be used as part of the communication campaign, but their reluctance also indicated difficulties in consciously accessing and verbalizing deeply personal and embodied experiences and sentiments (Karmanov 2008; Raymond *et al.* 2018). The sensitive nature of responses was also reflected in the unwillingness of respondents to give permission to use their background information in the campaign. Most used pseudonyms. Two-thirds (66%) declined to give any background information; most of those who did were female (19 out of 26 respondents). Children and elderly people were missing from the sample ($n = 24$, mean age 47, ranging from 26 to 69). Only 15 respondents revealed their place of residence, the majority from the Helsinki metropolitan area.

Notably, some respondents specifically stated that they have a second home in the countryside.

Wellbeing benefits from nature were often described without detailing the type of ecosystem delivering these benefits, as the category of ‘nature in general’ included almost a third (31%) of all ecosystem types mentioned (Fig. 1). Various ecosystem properties were appreciated, ranging from small-scale, such as single trees growing nearby, to large forested areas that enabled trekking without too much human disturbance. Ease of access was implicitly highlighted, since remote nature reserves or other wilderness areas were rarely mentioned. Green urban areas were mentioned almost as often as rural areas, despite the focus of the campaign on rural nature.

Terrestrial biomes were referenced more often than aquatic ones. Forests were the most commonly mentioned ecosystem type, cited almost twice as often as lakes. The descriptions of forest ecosystems typically lacked biological details. Rather, sentiments and feelings related to certain forest areas with a particular use history were noted: ‘I explore familiar plants along the forest path; every year they grow in the same spots.’

Lakes were mentioned both in terms of the use of second homes typically located near lakes and recreation opportunities provided by water. Finland has 500,000 s homes, which are important locations for interactions with natural landscapes (Pitkänen *et al.* 2011). Strong personal connections with second homes used mainly during summer were highlighted, but their potential for wintertime recreation was also noted: ‘The best thing in the midwinter is to have an opportunity to spend a relaxing week in the quiet and darkness at the cabin.’

In terms of the CICES framework, cultural ecosystem services dominated and far less attention was paid to provisioning services (Fig. 2). Notably, regulating services were referred to only indirectly. For example, the chance to hear natural sounds in suburban areas was emphasized without reference to the fact that dense vegetation serves to decrease anthropogenic noise.

Some 78% of respondents mentioned experiential use and 62% mentioned physical use. Typical experiential use involved the pleasant sensations of observing natural elements. Physical use involved a variety of activities ranging from running in harsh autumn weather and other physical activity in extreme conditions to being completely still and concentrating on active breathing of fresh air. Experiential and physical use were typically presented as intertwined activities such as walking in a forest and simultaneous observations of natural elements.

Opportunities for learning and environmental education are often presented as key cultural ecosystem services (de Groot *et al.* 2002; Kumar and Kumar 2008). The CICES classification mentions educational services as one component of intellectual and representative interactions. Learning in natural landscapes was specifically mentioned by one respondent in

Fig. 1 Ecosystem types mentioned. 106 occurrences of 10 main ecosystem types were identified from 77 responses

reference to the activities of a kindergarten class and another focusing on learning from detailed nature observations. One respondent highlighted experiencing nature through virtual environments. Spiritual and religious use was addressed only indirectly through references to graveyards as places that provide opportunities for nature observations and relaxation. However, the potential religious context of the nature experience was not highlighted.

Provisioning services received relatively little attention (8% of all mentioned ecosystem service types), especially in relation to their prominence in previous ecosystem service assessments (MEA 2005; Mononen *et al.* 2016). Hunting is a popular hobby in Finland, with over 300,000 registered hunters (OSF 2018), but only one respondent mentioned hunting, emphasizing social and psychological benefits, including the strong sense of community among hunters, the possibility of escape from everyday life, and nature experiences, rather than the acquisition of game. Another popular hobby, recreational fishing, was similarly mentioned in only one ‘recipe’ that focused mainly on experiential use. These hobbies are popular among men, while women were overrepresented amongst the respondents.

Fig. 2 Ecosystem services mentioned. 125 mentions of main ecosystem service types as classified by the CICES (2019) were identified from the 77 responses. (C = cultural ecosystem service, P = provisioning ecosystem service.)

Forests and wetlands in the country provide ample opportunities for picking wild berries and mushrooms. It has been estimated that the average Finn collects 6 kg of wild berries each year (Vaara 2015). Despite this, provisional services from wild plants were mentioned only by 10% of all respondents. Notably, instead of picking commonly collected berries (*Vaccinium myrtillus*, *Vaccinium vitis-idaea*), they emphasized the less popular activities of collecting herbs and other edible wild plants. Overall, nature was mentioned equally as often as a venue for eating as it was as a source of nutrition. This further underlines the perceived importance of experiential cultural ecosystem services.

Most respondents (79%) described the psychological health benefits of experiencing natural landscapes (Fig. 3). Restoration, recovery from stress, and relaxation in solitude were expressed as peacefulness, resting/emptying the mind, forgetting everyday life, and empowerment. Both cognitive stimuli and pleasure from observing nature were emphasized. Aesthetic values, subtle elements of nature, and intimate and private observations were highlighted rather than detailed, knowledge-intensive and publicly shared observations, such as bird-count competitions by ornithologists.

Fig. 3 Mechanisms for wellbeing effects identified from responses. A total of 121 mentions of three key wellbeing effects were identified

The majority of the respondents (66%) also addressed physical benefits, which were typically mentioned together with psychological benefits. The most commonly mentioned physical benefit was exercise and improvement of fitness. A variety of activities related to movement without motorized aids were mentioned and were related to both summertime and wintertime: walking, jogging, horse riding, cycling, skiing, and swimming. Only a few cases focused on physically demanding exercise, such as long hikes or long-distance running on nature trails. Some cases also mentioned fresh air, or how it was easier to breathe in nature, and the health benefits of food from nature. The perceived capacity of nature to alleviate pain or improve quality of sleep was occasionally mentioned.

The social benefits of nature experiences were addressed by less than a tenth of respondents, referencing walking in a park or forest with a friend or family members, for example. Pets were rarely mentioned, since the focus was on interspecies relations between humans and wildlife. Dog-walking as part of the nature experience was mentioned only twice.

Wellbeing benefits that are experienced or enjoyed instantly were prominent, but several medium- and long-term or delayed benefits were also mentioned, including improved sleep quality after exercising in nature, improved mood during the working week because of nature-based weekend activities, and the opportunity to enjoy berries or mushrooms stored for later use. Some stated how the memories of past pleasant activities can be highly valuable in cases where the activity is no longer possible because of aging or injury.

The importance of multisensory observations was evident (Fig. 4.). Sight was the most commonly mentioned sense but in many cases several senses were referenced by the same respondent. However, a quarter (26%) of respondents did not refer human perceptions of the environment. Descriptions of night highlighted the immersive multisensory effect caused by natural darkness, in which day vision is of little use. Descriptions of auditory observations emphasized natural soundscapes and

implicitly also the lack of anthropogenic noise. Olfactory observations were related to natural processes such as the smell of the forest after rain, but also human traditions such as the smell of smoke from a sauna stove. Tactile sensations focusing on cold snow, moist moss, or water were mentioned relatively often. The senses of balance and proprioception were indirectly referred by descriptions of sentiments from lying down in a meadow or in snow.

Strong sentiments of identification with nature were expressed as indicated by the statement: ‘We are one with nature: together we will endure.’ However, respondents expressed divided views regarding natural darkness. One raised the unpleasant lack of natural sunlight during snowless autumns and winters, and highlighted the importance of the scarce opportunities to enjoy the few hours of sunshine. Others highlighted darkness as a valuable natural resource. The opportunity to escape from city lights and other sources of light pollution (Lyytimäki 2013) was appreciated by those seeking opportunities to observe the stars or experience the Northern Lights.

Scales of the sensory experiences varied considerably. Spatial scales ranged from universal perspectives provided by gazing at night skies to detailed close-distance examination of individual plants. At both ends of the spatial spectrum, the key issue was detachment from everyday routines and immersion in the natural environment. The temporal scales also varied considerably, even though experiences lasting only a short time dominated the descriptions. These experiences were typically connected to longer-lasting processes of nature, such as growth cycles of plants and circadian and seasonal cycles.

Both easy-to-anticipate natural processes, such as seasonal changes and possibilities of pleasant surprises caused by unpredictable natural elements, were mentioned. Natural areas provided venues for safe encounters distanced from everyday life. One respondent stated this very succinctly: ‘A long walk into the unknown.’

Fig. 4 Human senses used to recognize and experience the wellbeing effects identified from responses. 138 mentions of five key human senses were identified

Discussion

Ecosystem services are anthropocentric constructs dependent on human valuation and communication. What becomes recognized as an ecosystem service or disservice is conditioned not only by ecosystem properties, but also by socio-demographic characteristics and personal-level preferences and attitudes, as well as cultural values (Mak and Jim 2019; Kohler *et al.* 2014; Zimmermann Teixeira *et al.* 2019). Specific historical settings, socio-cultural contexts, and collective and individual preferences largely govern how certain ecosystems are perceived, what features are highlighted or neglected in communication processes, and what is considered an ecosystem service or disservice (Kumar and Kumar 2008; Spangenberg *et al.* 2014; Lyytimäki 2014, 2017; Palta *et al.* 2016). Therefore, ecosystem service science is as much about understanding human valuation processes as it is about understanding ecosystem functions and properties.

As indicated by our results, written descriptions concisely summarizing people's preferences have their limitations but they nevertheless provide a useful data source by highlighting those, sometimes unexpected, aspects of nature that people considered enjoyable. Overall, the respondents' insights represent nature as something distanced from society and built environments, and describe it as a venue offering opportunities for breaks from everyday routines. However, they did not represent a complete separation from everyday experiences by idealizing nature as a remote and untouched wilderness, as discussed by Cronon (1996). Instead, the responses generally assumed that the creation of wellbeing benefits requires that:

- nature is physically separate from everyday settings but is still easily accessible;
- nature is detached from the requirements of work and other stress factors;
- nature offers good opportunities for a variety of multisensory and embodied experiments.

The results suggest that individual preferences are variable – especially since the number of respondents was relatively low, and the data gathering method used here was likely to reach those informants who shared an interest in natural environments. Despite the relatively uniform sample of respondents, a wide temporal, spatial, and functional diversity amongst the perceived ecosystem services was presented. Nature was seen not only as a provider of pleasant daytime summer landscapes but also soundscapes, smellscape, nightscapes, and snowscapes that are perceived through multisensory observations. In particular, a wide range of different cultural experiential services were emphasized. Despite the popularity of hunting, fishing, and foraging in Finland, provisioning services were mentioned relatively rarely. This is partially explained by the communication campaign not having been designed to specifically include recreational fishers or hunters. On the other hand, previous studies have shown that the perceived health and social benefits are often considered the most important aspects of fishing and hunting, rather than the meat or fish products they yield (Heinonen 2017). It is possible that collecting herbs was emphasized because of increased public attention highlighting the practice of foraging during the campaign.

Individual-level effects were prominent. This was partly because the data collection method focused on personal experiences, but probably also because Finnish culture generally appreciates private space, individualism, and independence (Salasuo 2007). For example, it has been noted that the use of urban green spaces by large groups of immigrants can differ considerably from the individualized way they are used by the indigenous population (Leikkilä *et al.* 2013). Similarly, Finland's rural second homes are places where only a very select group of people outside the nuclear family are welcomed to spend time, and the best kind of neighbors are often those 'far away' (Pitkänen 2008). The facts that Finnish cities are small and natural landscapes are accessible create

opportunities for individuals to use ecosystems in spontaneous and non-organized ways (Rehunen *et al.* 2018). Some respondents suggested that nature can also provide an important venue for socially shared experiences, but typically with close friends and family and often in the context of a family-owned cabin in a rural area. Social use of urban nature was not emphasized.

Parks and other urban ecosystems were not highlighted as sources of ecosystem services. This is partially explained by the relatively easy access to large forest areas in Finland and the cultural importance of forests (Salo 2015). In addition, the importance of lake ecosystems is partly explained by the cultural narratives of Finland as the ‘land of a thousand lakes,’ the abundant water resources, the large number of permanent and second homes situated near watercourses, and long use histories of many second homes (Jokinen 2002; Pitkänen *et al.* 2011). In particular, respondents indicated that in Finland, second homes situated in rural areas are important places for multisensory observations free of disturbances from urban environments.

Our results are in line with earlier studies pointing out that ecosystem services are recognized, valued, and consumed differently by different sectors of the public (Martín-López *et al.* 2012; Lyytimäki and Petersen 2014). Furthermore, the deeply sentimental attachment to certain places expressed by many respondents suggests that the valuation process is highly context-sensitive. Personal preferences can be influenced by physiological and socio-cultural factors such as gender, age, physical condition, as well as knowledge of certain ecosystems, personal use history, lifestyle, earlier experiences, and current expectations (Martín-López *et al.* 2012; Caballero-Serrano *et al.* 2017; Riechers *et al.* 2018). Importantly, personal and subjective factors are always intertwined with changing physical settings such as weather conditions.

The results suggest that the respondents recognize and appreciate non-material cultural ecosystem services. This highlights the need to develop more comprehensive and coherent ecosystem service mappings and assessments. For example, the provisioning services of Finnish forests are relatively well known, since there is a considerable amount of data and statistics allowing for the building of quantitative indicators and assessments (Saastamoinen *et al.* 2014). Information related to cultural ecosystem services remains scattered and difficult to use (Mononen *et al.* 2016). Most of the available data are collected through case studies – such as the present one – utilizing a wide variety of data sources and interpretation methods.

The results also caution against attempts to assess ecosystem services by using a single yardstick, such as monetary or utility value. The heterogeneity of the benefits based on inherently subjective, multi-sensory embodied experiences makes it difficult to find agreement on proper methods for monetary valuation (Jacobs *et al.* 2016). More fundamentally, as shown by several respondents indicating a deep appreciation of nature stemming from the intrinsic value independent of

instrumental benefits, monetary value may be a largely irrelevant issue. Thus, the results support calls for treating the natural environment as a constituent element of human wellbeing as opposed to an instrumental external factor (Schleicher *et al.* 2018).

A more advanced typology of cultural ecosystem services is needed to comprehensively capture the nuances of perceived benefits from nature. Conceptualizations such as the CICES typology reflect the dominant understanding of ecosystem services based largely on ecological research, which could be complemented by more inclusive approaches such as the Nature’s Contributions to People framework (La Notte *et al.* 2017; Ellis *et al.* 2019). Its ability to capture the variety of benefits as expressed and experienced by people remains inadequate. For example, appreciation of the cyclical, organic, and repetitive processes of nature poses a problem for mapping focusing on classes of different end products rather than the processes themselves. Sensitivity to the different socio-cultural contexts and various personal level ways of perceiving ecosystem services – and potential disservices – is a key issue (Palta *et al.* 2016; Lyytimäki 2017). Therefore, natural science-based structured methods of data collection focusing on ecosystem properties face a high risk of leaving relevant information out of the assessment. On the other hand, social science-based and context-sensitive data collection faces problems when generalizations are required. There probably is no silver bullet, but an interdisciplinary approach is a necessity for finding applicable solutions.

Conclusions

This study highlights not only the variability but also the incommensurability of the perceived benefits of natural landscapes. Respondents recognized a diverse set of health and wellbeing benefits emphasizing individual-level experiential issues. The key issue for perceived benefits lies not so much in the characteristics of the ecosystem but in the possibility of multisensory experiences and taking a break from work or home routines. These possibilities can be offered by a variety of ecosystems, ranging from a single tree to a large natural area. Notably, the importance of distant protected nature areas for the generation of perceived ecosystem services can be different from that of urban or suburban nature areas. A key conclusion is the importance of the embodied and subjective element for the assessment, management, and communication of ecosystem services. The perceived benefits may be governed more by personal use histories and the specific socio-cultural context than by ecosystem properties.

Future assessments should better acknowledge the importance of cultural ecosystem services. This requires a shift from assessment methods relying primarily on ecological data towards people-centric data. For instance, the analysis of

different non-material health benefits such as this study offers can provide new insights into understanding the multifaceted and overlapping nature of ecosystem services. Comprehensive assessment based on multiple data sources is needed in order to recognize both the diversity of biophysical processes that produce ecosystem services and the various ways in which humans perceive, value, and manage socio-ecological systems.

Finally, the results provide a warning against atomistic assessment, management, and communication focusing only on certain types of ecosystem services. Wellbeing benefits provided by ecosystems have predominantly been assessed from the perspective of natural sciences or economics. These disciplines have also dominated theoretical work outlining conceptual frameworks of ecosystem services and practical applications aimed at advancing the sustainable management of ecosystems. Social sciences and humanities approaches have received less attention. As the perceptions of benefits are typically based on multisensory observations and include various types of ecosystem services, they should be assessed by following a multidisciplinary and inclusive approach aiming at building a comprehensive overall picture. This also cautions against communication efforts overlooking the richness of nature experiences by focusing only on the monetary value of ecosystem services.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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