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► **To cite this version:**

Emilia Pramova, Bruno Locatelli, Merelyn Valdivia-díaz, Améline Vallet, Yésica Quispe Conde, et al.. Sensing, feeling, thinking: Relating to nature with the body, heart and mind. *People and Nature*, 2022, 4 (2), pp.351-364. 10.1002/pan3.10286 . hal-03482462

HAL Id: hal-03482462

<https://hal.science/hal-03482462>

Submitted on 11 Jul 2023

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RESEARCH ARTICLE

Sensing, feeling, thinking: Relating to nature with the body, heart and mind

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Funding information

Norwegian Agency for Development Cooperation; H2020 Environment; Consortium of International Agricultural Research Centers; French Ministry for the Ecological and Inclusive Transition; Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit

Handling Editor: Leah Gibbs

Abstract

1. The cultural ecosystem services (CES) construct has evolved to accommodate multiple worldviews, knowledge systems and conceptualizations of nature and values, including relational and mental health values.
2. Cultural ecosystem services research and practice has mostly focused on cognitive ways of constructing and expressing intangible values of, and relationships with, nature. But our non-material relationships with nature are not exclusively cognitive: sensory and affective processes are fundamental to how we build, enact and experience these relationships.
3. Building on the core ideas of relational values, embodied experiences and connectedness with nature, we present a simple framework to explore the sensory, affective and cognitive dimensions of human–nature interactions, as well as the settings and activities that frame them.
4. We demonstrate its use in a case study in the Peruvian Andes, where we applied an inductive, exploratory approach to elicit personal imageries and imaginings related to nature, place and recreation. The narratives shared were rich with symbolism and personal sensory experiences, emotions and memories, which the interviewees linked with general assertions about people, place and nature.
5. We discuss the usefulness of such a perspective for CES research, and for human well-being, environmental justice and landscape management.

KEYWORDS

cognition, cultural ecosystem services, emotion, environmental psychology, human–nature, sensation

1 | INTRODUCTION

The ecosystem services framework, which represents how ecosystems contribute to human well-being through material and non-material benefits, has strongly influenced environmental research,

management and policy (Buijs et al., 2018; Droste et al., 2018; Flint et al., 2013; Gould et al., 2020; Kadykalo et al., 2019; Pascual et al., 2017). Within this framework, well-being is used as a broad term to describe overall quality of life, happiness and satisfaction (MA, 2005; Wyn et al., 2015) along a spectrum of inter-related

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dimensions such as physical and mental health, identity and belonging, sense of control and security, and learning and inspiration (Russell et al., 2013).

Among the different types of ecosystem services, such as provisioning, regulating, supporting and cultural, the last type tries to capture the non-material ways people relate with ecosystems and nature more broadly (Chan et al., 2012; Gould et al., 2014, 2020). Despite this ambitious premise, scientists have criticized cultural ecosystem services (CES) for being too reductionist (Gould et al., 2020; Leyshon, 2014), for overlooking some non-instrumental values and pluralistic perceptions of nature (Comberti et al., 2015; Flint et al., 2013; James, 2016; Kirchhoff, 2019; Pascua et al., 2017), for perpetuating the provider–recipient conceptualization of human–nature relationships (Buijs et al., 2018; Chan et al., 2012; Gould et al., 2014) and for using universalized representations detached from concrete relationships, geographies and embodied experiences (Kolinjivadi, 2019; Raymond et al., 2013, 2018).

Such criticisms have contributed to the evolution of the concepts of ecosystem services and CES (Droste et al., 2018; Gould et al., 2020). The Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES) proposes the framing ‘Nature’s Contributions to People’ in an effort to accommodate multiple worldviews, knowledge systems and conceptualizations of nature and values, including relational values (Díaz et al., 2015; Kadykalo et al., 2019; Pascual et al., 2017). People’s relational values characterize the appropriateness of how they relate with nature and each other, including the principles, virtues and actions associated with a meaningful and good life (Chan et al., 2016). They include an ethics of care and appreciation that arise from these relationships (Kleespies & Dierkes, 2020) and link closely to notions such as connectedness with nature and sense of place (the latter considered a cultural ecosystem service).

Connectedness with nature is a sustained awareness of the inter-relatedness between one’s self and the rest of nature (Restall & Conrad, 2015; Zylstra et al., 2014). Sense of place is comprised of people’s emotional and psychological relationships to a particular place and the symbolic meanings they assign to it (Krasny et al., 2014; Masterson et al., 2017; Tschakert et al., 2020). It develops from direct and indirect individual experiences of different environments (Hausmann et al., 2016) but it is also socially constructed (Stokowski, 2002).

Cultural ecosystem services are inherently relational (Chan et al., 2011, 2012), meaning they cannot exist as ‘products’ of nature independently of the people–nature relationships that create them (Chan et al., 2011; Fish et al., 2016). As Fish et al. (2016, p. 211) have aptly put it, CES can be better understood as ‘relational processes and entities that people actively create and express through interactions with ecosystems’. To better integrate human–nature interactions, Raymond et al. (2018) propose to transition CES towards the concept of embodied ecosystems. Embodied ecosystems are constituted by a web of relations between environment, culture, body and mind, which are situational and dynamical (Raymond et al., 2018).

Human–nature connections are thus produced through an inter-activity of mind, body and environment (Cooke et al., 2016; Raymond et al., 2018; Wall-Reinius et al., 2019). How we relate to nature is not an exclusively cognitive or aesthetic affair (Cooke et al., 2016; Ives et al., 2017; Nisbet et al., 2009; Tassin, 2000). But this is what has been researched most prominently with CES, in addition to the prevailing quantification, spatial mapping and monetization of services such as recreation and scenic beauty (Chan et al., 2012; Gould et al., 2014).

The affective dimension of human–nature interactions has been examined in research related to connectedness with nature (Zylstra et al., 2014) and measured with instruments such as the Emotional Affinity towards Nature (EAN; Kals et al., 1999), the Nature Relatedness Scale (NRS; Nisbet et al., 2009) and the Love and Care for Nature Scale (LCN; Perkins, 2010). Mental health and well-being studies have also focused on the affective (Anderson et al., 2018), as well as human geography research, the latter within the field of emotional geographies exploring the interlinkages of emotions, space and society (Davidson et al., 2007; Davidson & Milligan, 2004; Thien, 2017). Apart from neuroscience and psychology, the sensory dimension has been researched mostly in human geography, tourism and outdoors studies (Agapito et al., 2013; Robertson et al., 2015; Rodaway, 1994), with some research related to human well-being, though there the focus has been predominantly on the visual sense (Franco et al., 2017).

With this paper, we hope to inspire more explorations of the sensory and affective dimensions of human–nature interactions and experiences of CES. Our main aim with this paper is to show the diversity of these interactions and experiences. We posit that exploring this diversity is central to understanding our relationship with nature (and essentially CES or non-material nature contributions to people; Daniel, 2001; Ives et al., 2017; Nisbet et al., 2009; Restall & Conrad, 2015; Russell et al., 2013). Such an understanding can also have implications for human well-being, equity and landscape management.

We start by presenting a simple framework to explore the sensory, affective and cognitive dimensions of human–nature interactions and the settings and activities that frame them. We use the framework to analyse interviewee narratives from the Apurímac region of the Peruvian Andes where we elicited personal imageries and imaginings related to nature, place and recreation from rural and urban dwellers in the area, as well as tourists and environmental professionals. The non-material aspects of human–nature interactions are relatively understudied in countries of the Global South (Buijs et al., 2018; Marczak & Sorokowski, 2018) and this is another gap that we hope to address. We proceed with discussing the relevance of such research for human well-being, equity and landscape management.

2 | FRAMEWORK AND DEFINITIONS

The conceptualisations of nature and human–nature relationships are as diverse as the contexts and ontologies they stem

from (Flint et al., 2013; Milgin et al., 2020; Russell et al., 2013; Zylstra et al., 2014). We use the term nature to refer to living and non-living components of ecosystems within a range of pristine and human-modified environments, while recognizing that this concept is simplistic yet political, and can be incompatible with non-Western worldviews. Imageries and imaginings convey both personal realities and perceptions, they are shaped by cognitive, memory-related and emotional processes but also material expressions (Nogué & Wilbrand, 2017). To analyse the mental imageries shared by our participants, we built a simple framework (Figure 1) inspired by the dimensions of place proposed by Switalski and Grêt-Regamey (2020).

Our framework includes five elements: settings, activities and three dimensions of experience (sensory, cognitive and affective). Under 'Settings' we consider living and non-living ecosystem components (e.g. trees, mountains), broader scenic images (e.g. vastness of the landscape) and more ephemeral elements (e.g. gentle morning breeze, sunset light and colours) as used by Farber and Hall (2007). We also included human-modified environments such

as agro-ecosystems and landscapes containing buildings (Russell et al., 2013).

With 'Activities', we consider metaphysical and intellectual interactions such as dreaming and imagining, inspired by 'channels of experience' (Russell et al., 2013), as well as structured and unstructured physical interactions such as hiking, playing freely and swimming (Ives et al., 2017).

To analyse nature experiences (illustrated in the top part of Figure 1), we expand on the internal dimensions of experience (sensation, cognition and affect) from the Experiencing Nature Model of Linzmayer et al. (2014), which is based on psychology and neurobiology literature (Barrett & Bliss-Moreau, 2009; Nelson, 2009; Schore, 2003).

People respond to sensory stimulation from the external environment, but they also generate multi-sensory images within themselves (Agapito et al., 2013; Hirschman & Hoolbrook, 1982; MacInnis & Price, 1987), which can be historical (recalling an event) or imagined (reconfiguring known sensory elements through imagination). Under 'Sensory experiences', we included experiences

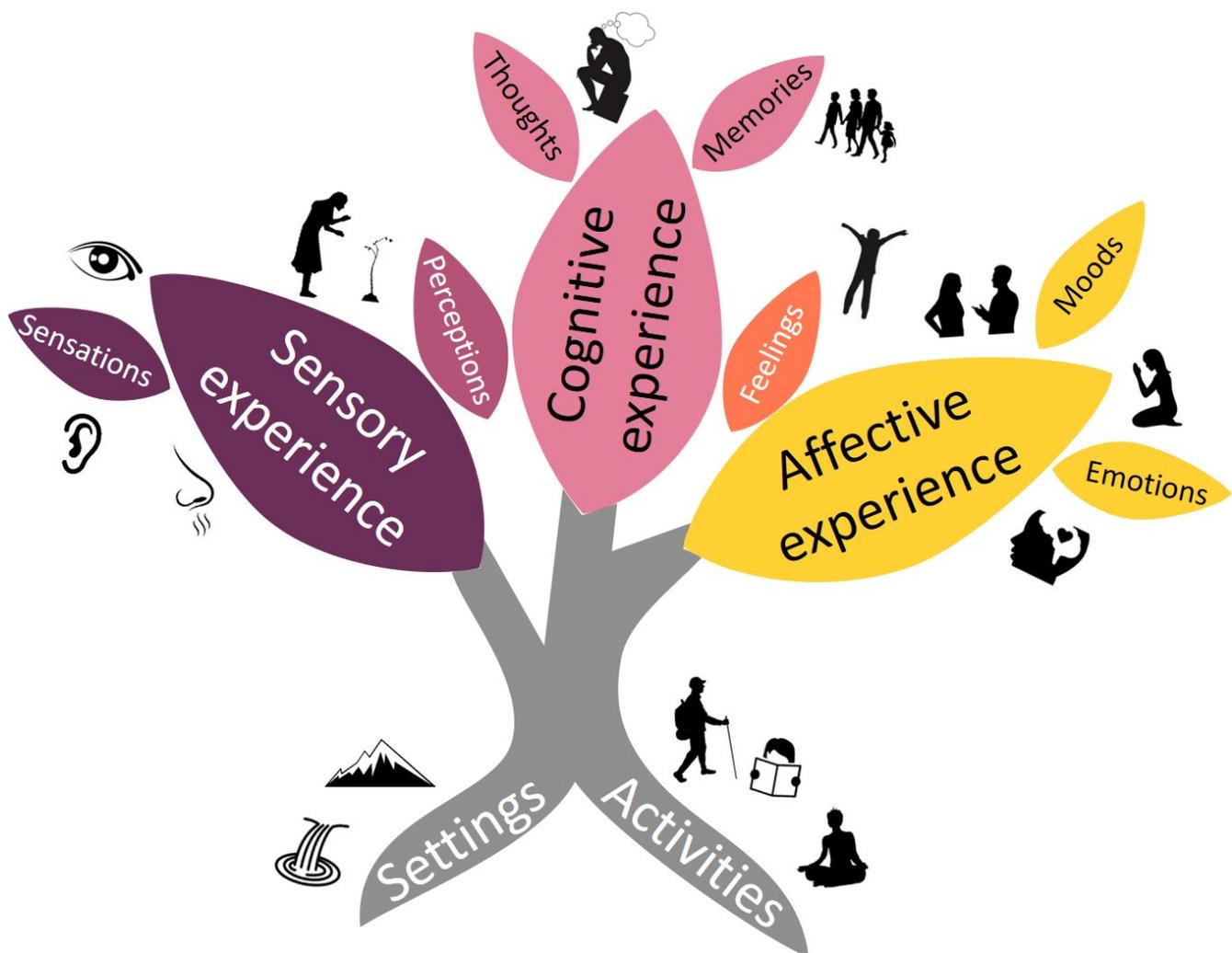


FIGURE 1 Proposed framework for analysing experiences with non-human natures

related to the five exteroceptive senses (sight, hearing, smell, taste and touch) and those related to movement (kinaesthetic) and gravity (Tuan, 1974). We also include perceptions formed by processing and interpreting external stimuli captured by our senses (Agapito et al., 2013; Goldstein & Brockmole, 2016; Ingold, 2000; Zimbardo et al., 2017). Our internal realm determines our perceptions of the world, as these mechanisms of processing and interpretation are shaped by experience, knowledge, values and emotional states (Agapito et al., 2013; Wilson-Mendenhall & Barsalou, 2016; Zimbardo et al., 2012).

It is impossible to separate the interdependent neural and psychological processes and delineate where perception stops and cognition begins (Leventhal & Scherer, 1987). But for practical analysis, we consider 'Cognitive experiences' to be conceptual and reflective processes such as thinking (Clore & Schiller, 2016; Leventhal & Scherer, 1987). These experiences involve values, attitudes, knowledge and beliefs and include memories, aesthetics, spiritual thoughts, nostalgia or inspiration (Farber & Hall, 2007; Ives et al., 2017; Williams & Harvey, 2001).

'Affective experiences' include moods, feelings and emotions (Clore & Schiller, 2016; Ortony et al., 1987; Zylstra et al., 2014). 'Affect' is a broad concept involving different kinds of valenced judgements from good/pleasant to bad/unpleasant (Clore et al., 1987; Clore & Schiller, 2016; Ortony et al., 1987). All emotions are affective, but not all affective conditions are emotions (Clore et al., 1987; Ortony et al., 1987). Emotions are internal, affective mental states that include dimensions of stimulus and valence, with emotional episodes being complex, structured events (Farber & Hall, 2007; Goldie, 2000; Lambie & Marcel, 2002; Ortony et al., 1987; Russell & Barrett, 1999). Emotions are episodic because they occur following a specific event or stimulus and are structured because they form part of a narrative or sequence containing actions, events, thoughts and feelings (Goldie, 2000). We consider feelings and emotions as affective experiences, recognizing that it is not practical to distinguish them.

Lastly, it is important to point out that sensation, emotion and cognition are integrated in experience and the internal processing thereof, making it difficult to determine where one internal process ends and another begins.

3 | METHODS

We interviewed 28 people in the city of Abancay (region of Apurimac, Peru) and two nearby villages (Ccorhuani and Llañocancha) in July 2016. This research was part of a broader project on ecosystem services in the Mariño watershed in Apurimac which was implemented to address a gap in such research in the region. Abancay is located on the eastern slopes of the Andes. The landscape is dominated by small-scale family farms with mixed crops and livestock and natural grasslands, shrublands and montane forests. Near the city, the Ampay National Sanctuary is a protected mountain, with forests, lakes and a glacier reaching 5,180 m a.s.l., which attracts local and

national tourists. Quechua Indigenous people represent a high proportion of the population (71% speak Quechua in Apurimac).

Interviewees were seven tourists (approached in the central square of the city and the bus station), seven urban dwellers (approached in the central square), seven rural dwellers (approached in the two villages) and seven professionals working on environmental issues (contacted through snowball sampling). Age range was 20–51 years (half were <30 years old), with the tourists coming from Argentina, Colombia, Peru (Lima), Spain and Switzerland. Interviewees were selected to obtain a diversity of views rather than being representative of a population. We introduced ourselves, explained our research objective and asked people if they were willing to talk about their feelings and thoughts regarding places and landscapes of the region. If they agreed, we immediately proceeded with the interview after requesting verbal consent to record the discussion and explaining that data would be anonymized. Due to the nature of the research and its anonymized analysis and use, we considered verbal consent to be sufficient. The interviews took place in the main square of the city (with the tourists and urban dwellers), in the villages (with the rural dwellers) and in offices (with the professionals working on environmental issues). Our research protocol was approved by CIFOR Research Ethics Review Committee (reference FTR044).

The first part of the interview was an ice-breaking discussion on the region, not used in the analysis (see Supporting Information 1). To start this discussion, we asked the participants to elaborate on what kind of landscapes they considered special in general, what they liked about the Abancay region and to point out their favourite places (we used a map of the watershed with all participants except for the tourists, as this group was not very familiar with the region).

In the second part, which lasted about 30 min on average, interviewees were invited to choose five photographs from a set of 15 (Figure 2) and to describe what they felt about each chosen place. We used an inductive, exploratory approach, minimizing issue framing as much as possible (see Supporting Information 1). We recorded 139 descriptions (called 'statements' hereafter).

We selected the 15 photographs to represent the diversity of sceneries or places in the region. All interviewee groups, apart from the tourists, knew the places of the photographs well. As for the tourists, they were travelling between Cusco and Lima and had stopped in Abancay because they had heard it was nice to discover. But even for those unfamiliar with the places in the photographs, exposure to photographs can itself be an experience of place and nature as it gives the viewer a sense of being in a particular environment (Hartig et al., 2011), triggering cognitive, affective and behavioural responses (Ballew & Omoto, 2018; Hartig & Evans, 1993).

All statements were transcribed and translated into English and edited (minor paraphrasing) for clarity. To code the statements, we listed all terms in the transcripts and removed stop words (i.e. words of no interest, e.g. 'the'). We used a 'grounded theory' approach in our content analysis (Strauss & Corbin, 1994) to analyse the imageries of participants, based on the emergence of repeated concepts

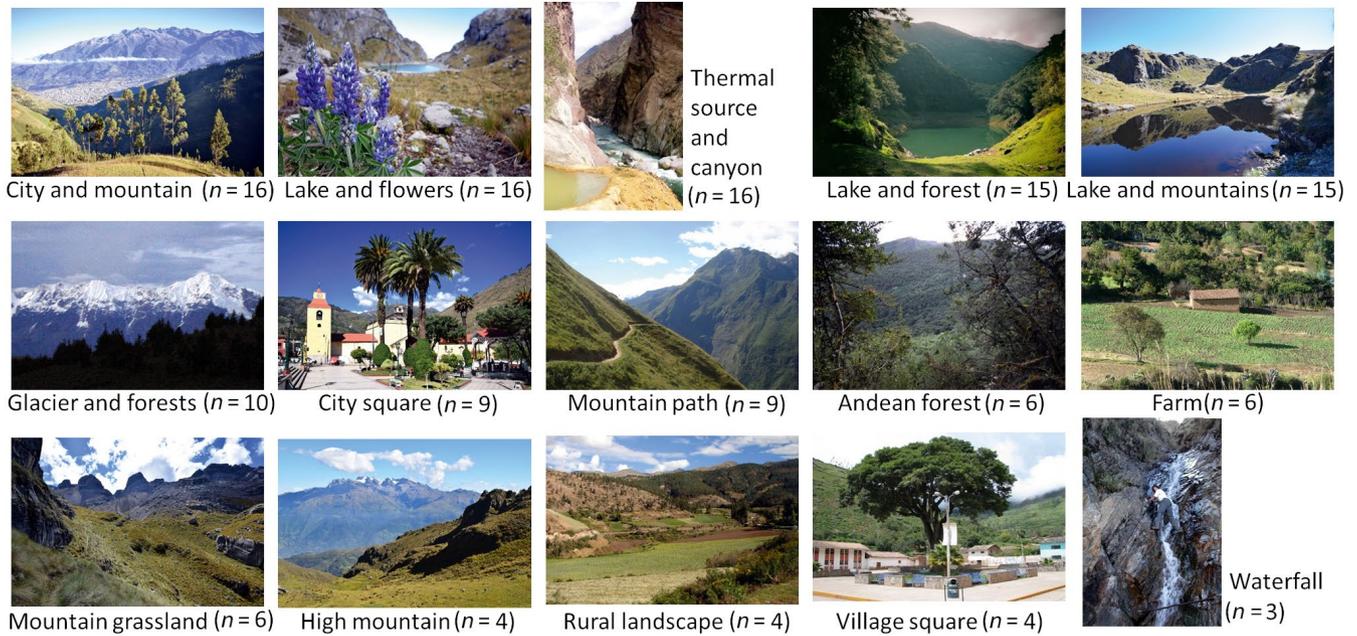


FIGURE 2 The 15 pictures commented on by interviewees, sorted by decreasing number of times (n) they were selected

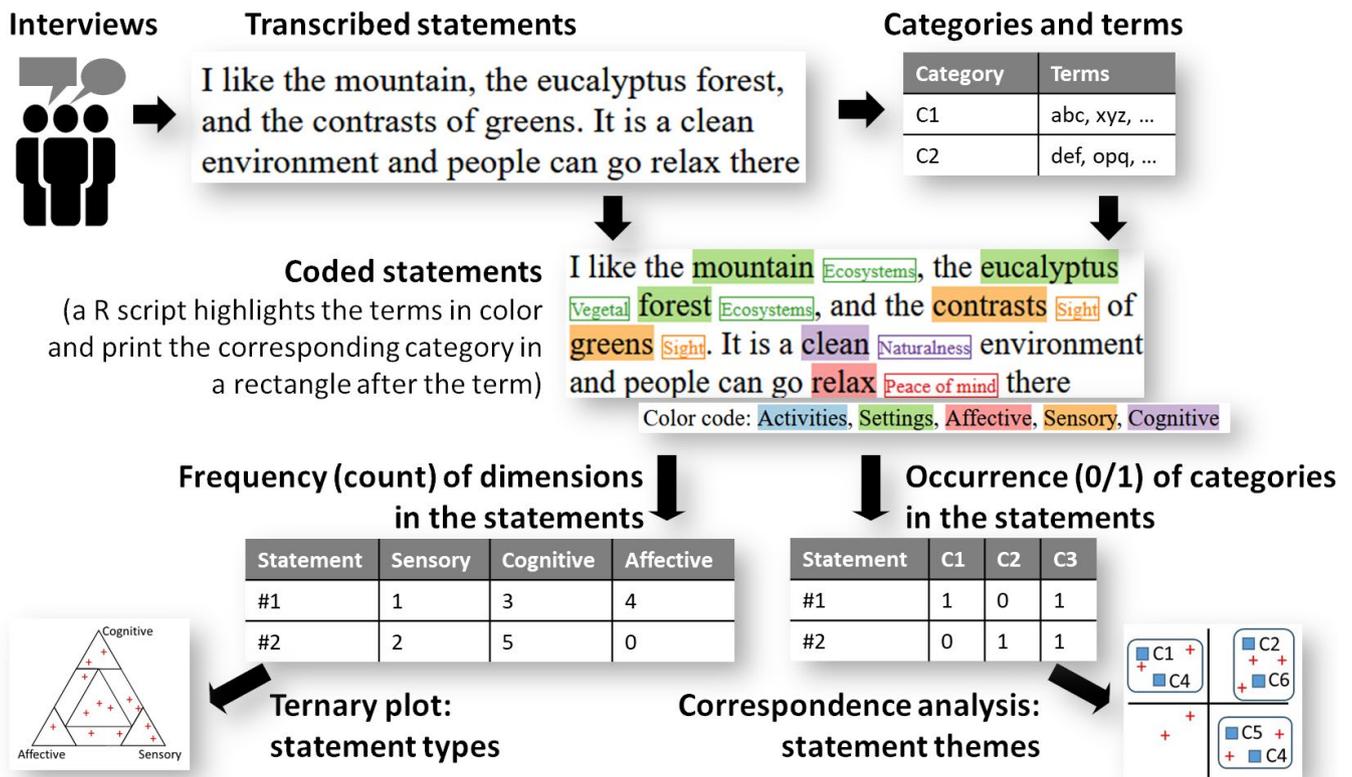


FIGURE 3 Visual summary of the different analysis steps

and types of experiences, rather than using an a priori typology. We then classified each term into one of the five dimensions of our framework: sensory, cognitive and affective experiences, settings and activities (Figure 3). If a term was ambiguous, we considered its context and if it had different meanings across the statements, it

was replaced with a more precise term (e.g. 'my life' or 'the cycle of life' instead of 'life'). We grouped terms with similar meanings within categories that were created progressively during the analysis of statements. For cognitive and affective dimensions, which had many terms, grouping was done by first creating subcategories

and then by merging subcategories into new terms (see Supporting Information 2).

We then counted how many times each term occurred in each statement (Figure 3). We used the counts of terms related to sensory, cognitive and affective dimensions to represent the statements in a ternary plot, classified into seven types depending on the dominant dimensions (e.g. sensory or cognitive-affective). We then analysed how categories co-occurred in the statements using correspondence analysis (Husson et al., 2017) to identify themes (defined as groups of co-occurring categories, essentially a grouping of the categories), which were illustrated with example statements. We used the R package *corpus* for text analysis (Huang & Perry, 2020), *ggtern* for ternary plots (Hamilton, 2020) and *FactoMineR* for correspondence analysis (Husson et al., 2020). A list of all the coded statements can be found in Supporting Information 3.

4 | RESULTS

Almost all statements included at least one mention of a setting (99%) or a cognitive experience (96%; Figure 4). More than half the statements reported a sensory (60%) or affective (55%) experience, whereas activities were mentioned infrequently (30%). The most frequent settings were abiotic (e.g. water, rock, snow) and vegetal (e.g. trees, grasses). The most frequent activities were physical interactions (e.g. visiting a place or swimming).

For sensory experience, the sense of sight was dominant but our interviewees also talked about touch, hearing, sense of movement and gravity, despite the visual prompt of photographs that we used to start the discussion.

sounds of birds, insects, my steps, or the click of the camera. (statement #92)

We found a high diversity of cognitive experiences (Table 1), the most frequent being connection to nature.

The water, the sky and the mountains remind me of similar places in other high mountain ecosystems. From my life experience, I am connected to this type of landscape. (statement #74)

Peace of mind was the most frequent category of affective experience, though participants also shared many other deep emotions and feelings.

I like the water when it is a little green and calm. I like the sound of the river and its colour, with the rocks and wind. Rivers take away everything you don't want. It gives me a lot of relaxation and I like it a lot. (statement #16)

The canyon, the geological forms, the water, the shapes filled with thermal water, the stalagmites and stalactites, the plants: everything is wonderful in this place. It is absolute fun, I usually go to this place at night when no one is there, you can see the stars. It is the strongest contact I have ever had. The sound of the river is like a music that reaches your heart. Although one of my friends died there, it transmits a fear and a joy to me to be in the middle of the canyon. (statement #39).

I like the smell of wet soil and the aromatic herbs. I like feeling the humidity of the forest. I like hearing the

Almost half of the statements (54%) were dominated by one of sensory, cognitive or affective experiences (Figure 5). Cognitive

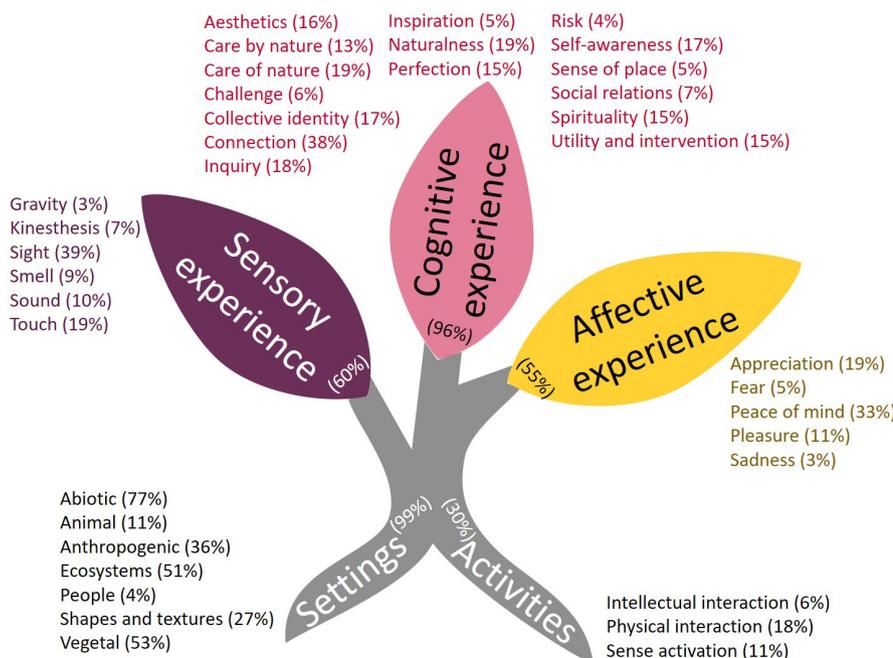


FIGURE 4 The categories of the five dimensions found in the analysed statements (numbers indicate the percentage of statements included in this category)

TABLE 1 Categories of sensory, cognitive and affective experiences found in our data with definitions or examples

Dimension	Category	Definitions or examples
Sensory	Gravity	Sensing space and discerning the pull of gravity within it
	Kinesthesia	Sensing self-movement and body position
	Sight	Perceiving things through the eyes
	Smell	Perceiving smells and odours through the nose
	Sound	Sensing sound and auditory vibrations through the ears
	Touch	Experiencing sensations through the skin
Cognitive	Aesthetics	Appreciating the beauty of nature
	Care by nature	Appreciating protection and well-being provided by nature
	Care of nature	Willing to protect nature
	Challenge	Imagining challenges to tackle in nature
	Collective identity	Reflecting on collective identity and heritage through nature
	Connection	Seeing oneself connected to nature
	Inquiry	Studying and inquiring into nature
	Inspiration	Finding ideas in nature
	Naturalness	Appreciating the purity and quietness of nature
	Perfection	Considering that nature is perfect
	Risk	Perceiving risks and dangers in nature
	Self-awareness	Reflecting on oneself while in nature
	Sense of place	Thinking about place meaning, attachment and belonging
	Social relations	Thinking of social relationships in nature
	Spirituality	Searching in nature for meaning in life or a connection to something bigger than oneself
	Utility and intervention	Acknowledging the benefits provided by nature and dominion of humans over nature
Affective	Appreciation	Experiencing fascination and awe, being grateful, feeling pride
	Fear	Experiencing fear, being scared
	Peace of mind	Feeling hopeful, free and calm
	Pleasure	Feeling happy and satisfied, experiencing joy, being euphoric, feeling love
	Sadness	Feeling sad

statements (i.e. with more than two thirds of terms on experience relating to cognitive experiences) had the highest relative frequency (43%), with affective statements the least frequent (2%; see examples in Table 2). For composite statements (where there was no clear

dominance of one experience), sensory-affective ones were rare (4%), whereas others had similar frequency (13%–15%).

The correspondence analysis showed the proximity between categories in the set of statements and, although the total variance explained by the two axes was only 15%, we were able to visually group categories into coherent themes (Figure 6; Table 3). For example, the adventurous theme referred to statements that emphasized fear, challenge and gravity (i.e. the challenge of climbing mountains) and the naturalist theme included cognitive experiences about naturalness, care of/by nature and inquiry, as well as sensory experiences such as touch and smell.

5 | DISCUSSION

5.1 | Nature experiences, connectedness and well-being

With this article, we examined personal imageries and imaginings related to nature and place experiences in the Abancay area of Apurimac, Peru. We analysed the verbal expressions of the imageries shared by our interviewees after being prompted to select and talk about places from photographs. Similar to Derrien & Stokowski's findings from analysing the discursive constructions of night sky experiences (2020), the narratives shared were rich with symbolism and personal sensory experiences, emotions and memories, which the interviewees linked with general assertions about people, place and nature. Our main objective was to show the diversity of narratives and the importance of the sensory and the emotional in people's interactions and relationships with place and nature.

Personal sensory and emotional experiences of an environment are essential for shaping place meaning and place attachment, which build up the sense of place (Barendse et al., 2016; Clarke et al., 2018; Krasny et al., 2014). Sensory and emotional experiences of *and in* nature are important for fostering connectedness with nature and overall well-being.

Many studies have demonstrated the restorative, stress-reducing effects of nature (Berto, 2014; Bratman et al., 2019; Hartig et al., 2011; Russell et al., 2013), as well as other physiological and psychological beneficial effects such as improved cardiovascular and immune functioning, improved cognitive abilities, increased life satisfaction, greater happiness and vitality, enhanced spiritual development and the reduction of several psychological symptoms (reviewed by Bowler et al., 2010; Bratman et al., 2019; Franco et al., 2017; Frumkin et al., 2017; Fuller et al., 2007; Haluza et al., 2014; Keniger et al., 2013; Russell et al., 2013). Abiotic components (e.g. minerals, rocks, geomorphological and hydrological features), although overlooked in ecosystem assessments (Gray, 2011), are also important for multiple aspects of well-being, ranging from physical and mental health to recreation, spiritual development, imagination and identity (Kubalíková, 2020; Teff-Seker & Orenstein, 2019). Many of the statements in our study also reflect this, adding to the call for a better integration of geodiversity with biodiversity in nature conservation and landscape management plans (Erikstad, 2013; Hjort et al., 2015).

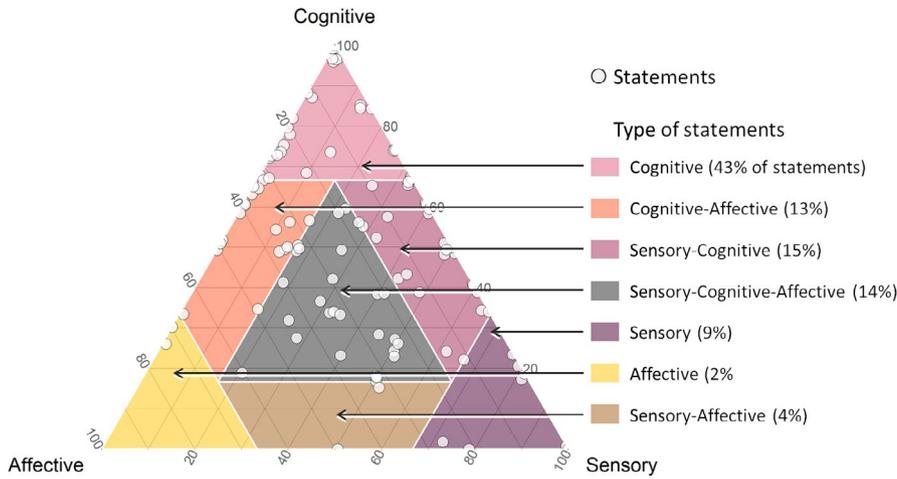


FIGURE 5 Ternary plot showing the distribution of statements according to the relative frequency of terms related to sensory, cognitive and affective experience

Type	Examples of statements
Sensory	#102. I like the mountains and the trees. Seeing a small town in the middle of the mountains is nice. There are so many trees around. They contrast with the mountain
Cognitive	#18. The forms of the rocks give you an understanding of how the mountains and the glacier have been shaped. The small lake shows the melting of snow. This picture shows one of the longest walks I have done, a challenge
Affective	#23. It gives peace of mind to contemplate the interactions between plants, soil, water and animals. I feel tranquillity, serenity

TABLE 2 Examples for three types of statements (see Supporting Information 3 for how statements were coded)

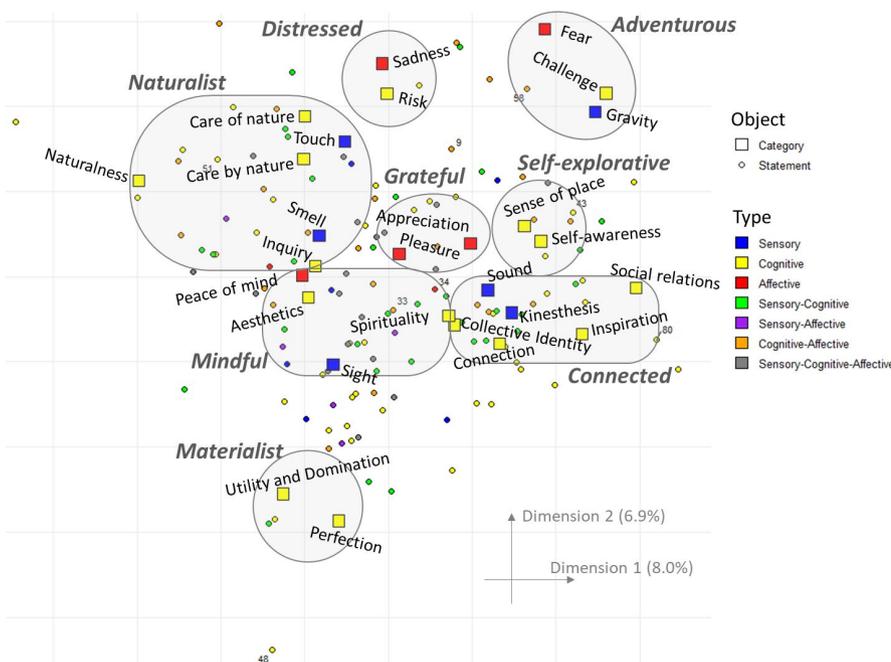


FIGURE 6 Correspondence analysis plot with categories of terms (square) and statements (circles), grouped into themes (shaded clusters)

Various theories have addressed why and how nature experiences contribute to well-being and connectedness. These can be classified according to the emphasis placed on behavioural determinants: innate or evolutionary (e.g. the Biophilia hypothesis, environmental preference theories), cultural (e.g. responses to nature as a function of attitudes,

beliefs and values shaped through learning and socialisation) or personal (e.g. unique individual traits, characteristics and experiences that shape the effects of other determinants; Hartig et al., 2011; Hartig & Evans, 1993). Sensory engagement is again a prerequisite for positive affective and cognitive states to arise, as well as for connectedness

TABLE 3 Examples of statements for the different themes

Theme	Examples of statements
Adventurous	#58. I feel fear in front of the greatness of the snowy mountains. It gives me a challenge, I'm here and I want to try to get there. With patience and perseverance, you can do whatever you want. Whoever reaches the summit conquers wisdom and patience. If the path is infinite you have to make your strength infinite
Distressed	#9. I see the little snow that remains and I see the grasses. This reminds the past but I see unpleasant changes and it makes me sad to think that the snowy mountains have lost their snow. But nevertheless the place is spectacular along the way. I am sad that snow is missing
Naturalist	#51. This forest gives me oxygen, it's healthy, it's beautiful. The trees are beautiful and the clean air is good for your health. Plants in the forest, such as trees, bromeliads and mosses, are important, we should keep them in the forest because, if not, the forest dries up, as they keep it moist
Materialist	#48. This place is organized and has harmony. There are crops and trees, everything is planted. We should all work the land like this, our farms would be nice
Self-explorative	#43. I feel proud of the palm trees, the houses and the church. This place reminds me of my childhood, it reminds me of my home
Grateful	#34. I enjoy the waterfall. I admire and appreciate its beauty. Being there to enjoy the fall of the water is admirable
Connected	#80. I like the rural areas and the life in the countryside. I see the cropland, the surrounding forests and the people. The families that live there are the ones who have the best connection to nature. When I think of the relationship of people with their environment in the countryside, I also feel part of my environment
Mindful	#33. I feel tranquillity, this place relaxes me. I feel happy to be able to observe this landscape with the trees, the vegetation, the forests and the fauna. Nature is always present in my mind because it is part of the beauty of the world

(Capaldi et al., 2017; Frumkin et al., 2017; Martin et al., 2020; Zylstra et al., 2014). It is not enough for people to spend time in nature, they also need to notice and appreciate nature to build connectedness and realize physiological, psychological and social benefits.

Finally, the effects of human–nature interactions on well-being may vary by socio-economic status, gender, preferences, personality, culture and held values, as well as the biophysical features of the setting and type of sensory input (Barendse et al., 2016; Bratman et al., 2019; Frumkin et al., 2017), although our study was not designed to test these variations.

We did not examine differences in imageries and experiences based on social-demographic characteristics, environmental conditions, activities, personal capabilities, values or time spent in nature. Understanding these relationships is important for future research, which may also examine different contributions of nature to well-being and their perceived importance against these differentiating characteristics and contextual factors. This includes contributions to sense of place and identity.

5.2 | Capabilities and equity

Values and nature experiences influence how CES contribute to well-being (Russell et al., 2013) as do capabilities (Fischer & Eastwood, 2016). Capabilities refer to the personal, social and environmental factors that determine what people are able to do and be, such as physical and financial capabilities, accessibility, skills and knowledge, perceived rights and confidence.

Elwell et al. (2020) illustrate this in a study with natural resource-dependent communities in Chile. These communities perceived CES,

especially those related to scenic beauty, biodiversity and space to recreate, as more important to well-being than some of the provisioning services on which they depended. They also advocated for small-scale tourism and conservation to enhance these services. The authors conclude that, due to their reliance on provisioning services, these communities spent more time in nature, and this allowed them to appreciate the outdoors as a place that meets needs beyond the material. In contrast, wage earners appreciated the well-being benefits of CES but less so than resource-dependent communities. This could be because they felt less able to access ecosystems to meet such needs or because they spent less time in nature and thus did not directly experience ecosystems as spiritual or recreation places.

Although looking at a different but still related variable, a study on modernization and emotional connectedness to nature in Kenya found that more traditional lifestyles were negatively related to connectedness (Marczak & Sorokowski, 2018). In this study, the constant nature contact of Meru communities in remote villages and pastoralist settlements was marked by dangerous wild animals, dry season extreme heat and water shortages, monsoon torrential rains and other hardships and risks. The authors explain their results with these contextual and environmental influences (less remote communities spent time in nature in a leisure context while the nature experience of remote communities was marked by hardships). Local and global dynamics continuously shape capabilities and context. The coronavirus (COVID-19) pandemic, for example, affected human–nature interactions through three inter-related pathways: changes in (a) opportunity (e.g. time available for going out in nature, increase in bird populations), (b) capability (e.g. psychological and physical capacity to engage with nature, which can be affected by stress, illness or government regulations) and (c) motivation (e.g. inclination towards outdoor activities; Soga et al., 2021).

Qualitative studies that focus on narratives and on internal experiences can illuminate the diversity of human–nature interactions but also shed light on capabilities. They can help to capture the context-specific, place-based and relational processes involved in the production of well-being benefits from these interactions (McCarter et al., 2018; Woodhouse et al., 2015), something which cannot be elicited through quantitative approaches (Gould et al., 2020). They also give a voice to the less powerful, which is important for more equitable landscape management.

An environmental justice and equity analysis examines the fairness of processes and (mal)distribution of harms and opportunities related to the environment, with a special focus on power, race and class (Sze & London, 2008). Places, the backbone of CES, are particularly important because they affect people's well-being and any action that involves places can be a source of justice or injustice (Higgins-Desbiolles et al., 2013). Such issues are pertinent for Abancay, as the region presents great opportunities for eco-tourism and conservation, with developments already underway (Valdivia Díaz, 2017; Valle Díaz, 2020; Vallet et al., 2020).

Eco-tourism, a popular use of CES, can impact sense of place and human–nature relationships through branding and place-making (Mostafanezhad & Norum, 2019; Swyngedouw, 2010) or through power (e.g. local government) establishing landscape meanings and rules (Masterson et al., 2017). Place-making in tourism happens by assigning sensations and emotions to particular places, where specific interactions between environment, human practices, sensations and emotions are prioritized and used to shape tourist experiences (Metro-Roland & Soica, 2019; Wall-Reinius et al., 2019). If only certain emotions are prioritized, there is a danger of invalidating, or even erasing, other emotions, lived experiences and human–nature interactions (especially those of local inhabitants). The same can happen with conservation initiatives.

Incorporating the diversity of lived experiences of both local communities and visitors, which narratives of sensory, emotional and cognitive experiences can help illuminate, is an opportunity to negotiate contested views of nature, CES and well-being, for a more inclusive ecosystem and landscape governance.

5.3 | Engaging with the diversity of experiences

Different approaches are suggested for incorporating the diversity of lived experiences. The biocultural approach to conservation and landscape management advocates for capturing the whole diversity of place-based human–nature interactions and relational understandings of well-being, with an emphasis on the cultural practices that influence and are influenced by the land- and seascapes in question (McCarter et al., 2018; Sterling et al., 2017). Non-prescriptive human well-being frameworks that allow for subjective perceptions and indicators can help to explore the benefits and trade-offs of different conservation and land use strategies more holistically (Beauchamp et al., 2018; Wali et al., 2017). Along these lines, viewsheds, soundscapes and sense of place have been proposed as boundary concepts

for fostering communication between stakeholders in the management of national parks in South Africa (Barendse et al., 2016). Raymond et al. (2013) propose the systematic consideration of multiple metaphors of human–nature relationships for a more deliberative approach to ecosystem research and management, while Jackson and Palmer (2015) advocate for including socio-ecological practices as services in the ecosystem services framework. 'Socio-ecological practices as services' acknowledges human cognition, care and labour, as well as non-human agency, in shaping and producing the ecosystems which are the source of multiple other benefits.

Engaging with the entire spectrum of the lived experience—cognitions, emotions and sensations—will lead to a greater understanding of people–place and people–nature relationships (Davidson et al., 2007; Masterson et al., 2017; Zylstra et al., 2014). This can inform the design of interventions that are beneficial to both human well-being and biodiversity (Petersen et al., 2019; Zylstra et al., 2014). At the very local scale, even small interventions are important for improving the accessibility of CES and subsequently human well-being. These can be, for example, hedges of native trees and shrubs, edible forest gardens and simple infrastructure such as a bench highlighting a lookout point for observing nature (Elwell et al., 2020). Such interventions have been popping up in urban areas, but much remains to be done in ensuring access for people with different capabilities and from different socio-economic backgrounds (Andersson et al., 2014; Elwell et al., 2020; Zylstra et al., 2014).

6 | CONCLUSION

With this article, we wanted to demonstrate the diversity of imageries of human–nature interactions and experiences and how it goes beyond the cognitive aspects usually examined in CES research. Exploring how people enact, experience and articulate their relationship with place and nature is important for more equitable environmental management and landscape planning, and for biodiversity conservation and human well-being. Emotions and sensations are fundamental aspects of these relationships and should be valued along with cognitions such as attitudes, beliefs and values. Qualitative, narrative approaches are particularly suited for revealing these aspects, as well as the contextualised links between CES and well-being.

ACKNOWLEDGEMENTS

This paper is a contribution from the Transformative Adaptation Research Alliance (TARA, <https://research.csiro.au/tara/>), an international network of researchers and practitioners dedicated to the development and implementation of novel approaches to transformative adaptation to global change. The funding partners that have supported this research include the International Climate Initiative (IKI, project 15_III_075) of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), the Norwegian Agency for Development Cooperation (agreement QZA-016/0110), the European Union's H2020 research

and innovation program (SINCERE Project), the French Ministry for the Ecological and Inclusive Transition and the CGIAR Research Program on Forests, Trees and Agroforestry (CRP FTA) with financial support from the CGIAR Fund. The authors are grateful to Helvetas, the Andean Forest Program, the Centre for Social Development and Research (CEDES) and the Institute for Development and Environment (IDMA) for their support in organizing the field work. They thank all interviewees for their time and rich information, and the anonymous reviewers for their useful comments.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

Conceptualization and methods: E.P., B.L. and M.V.D., with feedback from all authors. Data collection: M.V.D. Data Curation and Analysis: B.L. Writing – Original Draft Preparation: E.P., B.L. Writing – Review & Editing: All authors.

DATA AVAILABILITY STATEMENT

Transcribed verbal statements were used in the analysis. The anonymized statements are publicly available on the figshare repository <https://doi.org/10.6084/m9.figshare.16918891> (Locatelli, 2021).

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REFERENCES

- Agapito, D., Mendes, J., & Valle, P. (2013). Exploring the conceptualization of the sensory dimension of tourist experiences. *Journal of Destination Marketing & Management*, 2(2), 62–73. <https://doi.org/10.1016/j.jdmm.2013.03.001>
- Anderson, C. L., Monroy, M., & Keltner, D. (2018). Awe in nature heals: Evidence from military veterans, at-risk youth, and college students. *Emotion*, 18(8), 1195–1202. <https://doi.org/10.1037/emo0000442>
- Andersson, E., Barthel, S., Borgström, S., Colding, J., Elmqvist, T., Folke, C., & Gren, Å. (2014). Reconnecting cities to the biosphere: Stewardship of green infrastructure and urban ecosystem services. *Ambio*, 43(4), 445–453. <https://doi.org/10.1007/s13280-014-0506-y>
- Ballew, M. T., & Omoto, A. M. (2018). Absorption: How nature experiences promote awe and other positive emotions. *Ecopsychology*, 10(1), 26–35. <https://doi.org/10.1089/eco.2017.0044>
- Barendse, J., Roux, D., Erfmann, W., Baard, J., Kraaij, T., & Nieuwoudt, C. (2016). Viewshed and sense of place as conservation features: A case study and research agenda for South Africa's national parks. *Koedoe*, 58(1), 16. <https://doi.org/10.4102/koedoe.v58i1.1357>
- Barrett, L. F., & Bliss-Moreau, E. (2009). Chapter 4 Affect as a psychological primitive. In *Advances in experimental social psychology* (Vol. 41, pp. 167–218). Academic Press. [https://doi.org/10.1016/S0065-2601\(08\)00404-8](https://doi.org/10.1016/S0065-2601(08)00404-8)
- Beauchamp, E., Woodhouse, E., Clements, T., & Milner-Gulland, E. J. (2018). 'Living a good life': Conceptualizations of well-being in a conservation context in Cambodia. *Ecology and Society*, 23(2), art28. <https://doi.org/10.5751/ES-10049-230228>
- Berto, R. (2014). The role of nature in coping with psycho-physiological stress: A literature review on restorativeness. *Behavioral Sciences*, 4(4), 394–409. <https://doi.org/10.3390/bs4040394>
- Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., & Pullin, A. S. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*, 10(1), 456. <https://doi.org/10.1186/1471-2458-10-456>
- Bratman, G. N., Anderson, C. B., Berman, M. G., Cochran, B., de Vries, S., Flanders, J., Folke, C., Frumkin, H., Gross, J. J., Hartig, T., Kahn, P. H., Kuo, M., Lawler, J. J., Levin, P. S., Lindahl, T., Meyer-Lindenberg, A., Mitchell, R., Ouyang, Z., Roe, J., ... Daily, G. C. (2019). Nature and mental health: An ecosystem service perspective. *Science Advances*, 5(7), eaax0903. <https://doi.org/10.1126/sciadv.aax0903>
- Buijs, A., Fischer, A., & Muhar, A. (2018). From urban gardening to planetary stewardship: Human–nature relationships and their implications for environmental management. *Journal of Environmental Planning and Management*, 61(5–6), 747–755. <https://doi.org/10.1080/09640568.2018.1429255>
- Capaldi, C. A., Passmore, H.-A., Ishii, R., Chistopolskaya, K. A., Vowinkel, J., Nikolaev, E. L., & Semikin, G. I. (2017). Engaging with natural beauty may be related to well-being because it connects people to nature: Evidence from three cultures. *Ecopsychology*, 9(4), 199–211. <https://doi.org/10.1089/eco.2017.0008>
- Chan, K. M. A., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S., Gómez-Baggethun, E., Gould, R., Hannahs, N., Jax, K., Klain, S., Luck, G. W., Martín-López, B., Muraca, B., Norton, B., Ott, K., Pascual, U., Satterfield, T., Tadaki, M., Taggart, J., & Turner, N. (2016). Opinion: Why protect nature? Rethinking values and the environment. *Proceedings of the National Academy of Sciences of the United States of America*, 113(6), 1462–1465. <https://doi.org/10.1073/pnas.1525002113>
- Chan, K. M. A., Goldstein, J., Satterfield, T., Hannahs, N., Kikiloi, K., Naidoo, R., Vadeboncoeur, N., & Woodside, U. (2011). Cultural services and non-use values. In P. Kareiva, H. Tallis, T. H. Ricketts, G. C. Daily, & S. Polasky (Eds.), *Natural capital* (pp. 206–228). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199588992.003.0012>
- Chan, K. M. A., Guerry, A. D., Balvanera, P., Klain, S., Satterfield, T., Basurto, X., Bostrom, A., Chuenpagdee, R., Gould, R., Halpern, B. S., Hannahs, N., Levine, J., Norton, B., Ruckelshaus, M., Russell, R., Tam, J., & Woodside, U. (2012). Where are cultural and social in ecosystem services? A framework for constructive engagement. *BioScience*, 62(8), 744–756. <https://doi.org/10.1525/bio.2012.62.8.7>
- Clarke, D., Murphy, C., & Lorenzoni, I. (2018). Place attachment, disruption and transformative adaptation. *Journal of Environmental Psychology*, 55, 81–89. <https://doi.org/10.1016/j.jenvp.2017.12.006>
- Clore, G. L., Ortony, A., & Foss, M. A. (1987). The psychological foundations of the affective lexicon. *Journal of Personality and Social Psychology*, 53(4), 751–766. <https://doi.org/10.1037/0022-3514.53.4.751>
- Clore, G., & Schiller, A. (2016). New light on the affect-cognition connection. In L. F. Barrett, M. Lewis, & J. Haviland-Jones (Eds.), *The handbook of emotions* (4th ed., pp. 532–547). Guilford Press.

- Comberti, C., Thornton, T. F., Wyllie de Echeverria, V., & Patterson, T. (2015). Ecosystem services or services to ecosystems? Valuing cultivation and reciprocal relationships between humans and ecosystems. *Global Environmental Change*, 34, 247–262. <https://doi.org/10.1016/j.gloenvcha.2015.07.007>
- Cooke, B., West, S., & Boonstra, W. J. (2016). Dwelling in the biosphere: Exploring an embodied human–environment connection in resilience thinking. *Sustainability Science*, 11(5), 831–843. <https://doi.org/10.1007/s11625-016-0367-3>
- Daniel, T. C. (2001). Whither scenic beauty? Visual landscape quality assessment in the 21st century. *Landscape and Urban Planning*, 54(1–4), 267–281. [https://doi.org/10.1016/S0169-2046\(01\)00141-4](https://doi.org/10.1016/S0169-2046(01)00141-4)
- Davidson, J., Bondi, L., & Smith, M. (Eds.). (2007). *Emotional geographies*. Routledge, Taylor & Francis Group.
- Davidson, J., & Milligan, C. (2004). Embodying emotion sensing space: Introducing emotional geographies. *Social & Cultural Geography*, 5(4), 523–532. <https://doi.org/10.1080/1464936042000317677>
- Derrien, M. M., & Stokowski, P. A. (2020). Discursive constructions of night sky experiences: Imagination and imaginaries in national park visitor narratives. *Annals of Tourism Research*, 85. <https://doi.org/10.1016/j.annals.2020.103038>
- Díaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M., Ash, N., Larigauderie, A., Adhikari, J. R., Arico, S., Báldi, A., Bartuska, A., Baste, I. A., Bilgin, A., Brondizio, E., Chan, K. M. A., Figueroa, V. E., Duraipapp, A., Fischer, M., Hill, R., ... Zlatanova, D. (2015). The IPBES conceptual framework—Connecting nature and people. *Current Opinion in Environmental Sustainability*, 14, 1–16. <https://doi.org/10.1016/j.cosust.2014.11.002>
- Droste, N., D'Amato, D., & Goddard, J. J. (2018). Where communities intermingle, diversity grows – The evolution of topics in ecosystem service research. *PLoS ONE*, 13(9), e0204749. <https://doi.org/10.1371/journal.pone.0204749>
- Elwell, T. L., López-Carr, D., Gelcich, S., & Gaines, S. D. (2020). The importance of cultural ecosystem services in natural resource-dependent communities: Implications for management. *Ecosystem Services*, 44. <https://doi.org/10.1016/j.ecoser.2020.101123>
- Erikstad, L. (2013). Geoheritage and geodiversity management – The questions for tomorrow. *Proceedings of the Geologists' Association*, 124(4), 713–719. <https://doi.org/10.1016/j.jpgeola.2012.07.003>
- Farber, M. E., & Hall, T. E. (2007). Emotion and environment: Visitors' extraordinary experiences along the Dalton Highway in Alaska. *Journal of Leisure Research*, 39(2), 248–270. <https://doi.org/10.1080/00222216.2007.11950107>
- Fischer, A., & Eastwood, A. (2016). Coproduction of ecosystem services as human–nature interactions – An analytical framework. *Land Use Policy*, 52, 41–50. <https://doi.org/10.1016/j.landusepol.2015.12.004>
- Fish, R., Church, A., & Winter, M. (2016). Conceptualising cultural ecosystem services: A novel framework for research and critical engagement. *Ecosystem Services*, 21, 208–217. <https://doi.org/10.1016/j.ecoser.2016.09.002>
- Flint, C. G., Kunze, I., Muhar, A., Yoshida, Y., & Penker, M. (2013). Exploring empirical typologies of human–nature relationships and linkages to the ecosystem services concept. *Landscape and Urban Planning*, 120, 208–217. <https://doi.org/10.1016/j.landurbplan.2013.09.002>
- Franco, L. S., Shanahan, D. F., & Fuller, R. A. (2017). A review of the benefits of nature experiences: More than meets the eye. *International Journal of Environmental Research and Public Health*, 14(8), 864. <https://doi.org/10.3390/ijerph14080864>
- Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn Jr., P. H., Lawler, J. J., Levin, P. S., Tandon, P. S., Varanasi, U., Wolf, K. L., & Wood, S. A. (2017). Nature contact and human health: A research agenda. *Environmental Health Perspectives*, 125(7). <https://doi.org/10.1289/EHP1663>
- Fuller, R. A., Irvine, K. N., Devine-Wright, P., Warren, P. H., & Gaston, K. J. (2007). Psychological benefits of greenspace increase with biodiversity. *Biology Letters*, 3(4), 390–394. <https://doi.org/10.1098/rsbl.2007.0149>
- Goldie, P. (2000). *The emotions: A philosophical exploration*. Clarendon Press.
- Goldstein, E. B., & Brockmole, J. R. (2016). *Sensation and perception* (10th ed.). Cengage Learning.
- Gould, R. K., Adams, A., & Vivanco, L. (2020). Looking into the dragons of cultural ecosystem services. *Ecosystems and People*, 16(1), 257–272. <https://doi.org/10.1080/26395916.2020.1815841>
- Gould, R. K., Klain, S. C., Ardoin, N. M., Satterfield, T., Woodside, U., Hannahs, N., Daily, G. C., & Chan, K. M. (2014). A protocol for eliciting nonmaterial values through a cultural ecosystem services frame: Analyzing Cultural Ecosystem Services. *Conservation Biology*, 29(2), 575–586. <https://doi.org/10.1111/cobi.12407>
- Gray, M. (2011). Other nature: Geodiversity and geosystem services. *Environmental Conservation*, 38(3), 271–274. <https://doi.org/10.1017/S0376892911000117>
- Haluza, D., Schönbauer, R., & Cervinka, R. (2014). Green perspectives for public health: A Narrative review on the physiological effects of experiencing outdoor nature. *International Journal of Environmental Research and Public Health*, 11(5), 5445–5461. <https://doi.org/10.3390/ijerph110505445>
- Hamilton, N. (2020). Package ggtern (3.3.0) [Computer software]. <https://cran.r-project.org/web/packages/ggtern/index.html>
- Hartig, T., & Evans, G. W. (1993). Chapter 17 psychological foundations of nature experience. In T. Gärling & R. G. Golledge (Eds.), *Behavior and environment: psychological and geographical approaches* (Vol. 96, pp. 427–457). North-Holland. [https://doi.org/10.1016/S0166-4115\(08\)60053-9](https://doi.org/10.1016/S0166-4115(08)60053-9)
- Hartig, T., van den Berg, A. E., Hagerhall, C. M., Tomalak, M., Bauer, N., Hansmann, R., Ojala, A., Syngollitou, E., Carrus, G., van Herzele, A., Bell, S., Podesta, M. T. C., & Waaseth, G. (2011). Health benefits of nature experience: Psychological, social and cultural processes. In K. Nilsson, M. Sangster, C. Gallis, T. Hartig, S. de Vries, K. Seeland, & J. Schipperijn (Eds.), *Forests, trees and human health* (pp. 127–168). Springer. https://doi.org/10.1007/978-90-481-9806-1_5
- Hausmann, A., Slotow, R., Burns, J. K., & Di Minin, E. (2016). The ecosystem service of sense of place: Benefits for human well-being and biodiversity conservation. *Environmental Conservation*, 43(2), 117–127. <https://doi.org/10.1017/S0376892915000314>
- Higgins-Desbiolles, F., Powys Whyte, K., & Tedmanson, D. (2013). Tourism and environmental justice. In K. Schwab & D. Dustin (Eds.), *Just leisure: Things that we believe in* (pp. 91–100). Sagamore Pub.
- Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing*, 46(3), 92–101. <https://doi.org/10.1177/002224298204600314>
- Hjort, J., Gordon, J. E., Gray, M., & Hunter, M. L. (2015). Why geodiversity matters in valuing nature's stage: Why geodiversity matters. *Conservation Biology*, 29(3), 630–639. <https://doi.org/10.1111/cobi.12510>
- Huang, L., & Perry, P. O. (2020). Package corpus (0.10.1) [Computer software]. Retrieved from <https://github.com/leslie-huang/r-corpus>
- Husson, F., Josse, J., Lê, S., & Mazet, J. (2020). Package FactoMineR (2.3) [Computer software]. Retrieved from <https://cran.r-project.org/web/packages/FactoMineR/>
- Husson, F., Lê, S., & Pagès, J. (2017). *Exploratory multivariate analysis by example using R*. CRC Press.
- Ingold, T. (2000). *The perception of the environment: Essays on livelihood, dwelling and skill*. Routledge.
- Ives, C. D., Giusti, M., Fischer, J., Abson, D. J., Klanićki, K., Dorninger, C., Laudan, J., Barthel, S., Abernethy, P., Martín-López, B., Raymond, C. M., Kendal, D., & von Wehrden, H. (2017). Human–nature connection: A multidisciplinary review. *Current Opinion in Environmental*

- Sustainability*, 26–27, 106–113. <https://doi.org/10.1016/j.cosust.2017.05.005>
- Jackson, S., & Palmer, L. R. (2015). Reconceptualizing ecosystem services: Possibilities for cultivating and valuing the ethics and practices of care. *Progress in Human Geography*, 39(2), 122–145. <https://doi.org/10.1177/0309132514540016>
- James, S. P. (2016). Ecosystem services and the value of places. *Ethical Theory and Moral Practice*, 19(1), 101–113. <https://doi.org/10.1007/s10677-015-9592-6>
- Kadykalo, A. N., López-Rodríguez, M. D., Ainscough, J., Droste, N., Ryu, H., Ávila-Flores, G., Le Clech, S., Muñoz, M. C., Nilsson, L., Rana, S., Sarkar, P., Sevecke, K. J., & Harmáčková, Z. V. (2019). Disentangling 'ecosystem services' and 'nature's contributions to people'. *Ecosystems and People*, 15(1), 269–287. <https://doi.org/10.1080/26395916.2019.1669713>
- Kals, E., Schumacher, D., & Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior*, 31(2), 178–202. <https://doi.org/10.1177/00139169921972056>
- Keniger, L., Gaston, K., Irvine, K., & Fuller, R. (2013). What are the benefits of interacting with nature? *International Journal of Environmental Research and Public Health*, 10(3), 913–935. <https://doi.org/10.3390/ijerph10030913>
- Kirchhoff, T. (2019). Abandoning the concept of cultural ecosystem services, or against natural–scientific imperialism. *BioScience*, 69(3), 220–227. <https://doi.org/10.1093/biosci/biz007>
- Kleespies, M. W., & Dierkes, P. W. (2020). Exploring the construct of relational values: An empirical approach. *Frontiers in Psychology*, 11, 209. <https://doi.org/10.3389/fpsyg.2020.00209>
- Kolinjivadi, V. (2019). Avoiding dualisms in ecological economics: Towards a dialectically-informed understanding of co-produced socio-natures. *Ecological Economics*, 163, 32–41. <https://doi.org/10.1016/j.ecolecon.2019.05.004>
- Krasny, M. E., Crestol, S. R., Tidball, K. G., & Stedman, R. C. (2014). New York City's oyster gardeners: Memories and meanings as motivations for volunteer environmental stewardship. *Landscape and Urban Planning*, 132, 16–25. <https://doi.org/10.1016/j.landurbplan.2014.08.003>
- Kubalíková, L. (2020). Cultural ecosystem services of geodiversity: A case study from Stránská skála (Brno, Czech Republic). *Land*, 9(4), 105. <https://doi.org/10.3390/land9040105>
- Lambie, J. A., & Marcel, A. J. (2002). Consciousness and the varieties of emotion experience: A theoretical framework. *Psychological Review*, 109(2), 219–259. <https://doi.org/10.1037/0033-295X.109.2.219>
- Leventhal, H., & Scherer, K. (1987). The relationship of emotion to cognition: A functional approach to a semantic controversy. *Cognition and Emotion*, 1(1), 3–28. <https://doi.org/10.1080/02699938708408361>
- Leyshon, C. (2014). Cultural ecosystem services and the challenge for cultural geography: Cultural ecosystem services and cultural geography. *Geography Compass*, 8(10), 710–725. <https://doi.org/10.1111/gec3.12160>
- Linzmayr, C. D., Halpenny, E. A., & Walker, G. J. (2014). A multidimensional investigation into children's optimal experiences with nature. *Landscape Research*, 39(5), 481–501. <https://doi.org/10.1080/01426397.2012.751094>
- Locatelli, B. (2021). Data for the paper "Sensing, feeling, thinking". <https://doi.org/10.6084/m9.figshare.16918891.v2>
- MacInnis, D. J., & Price, L. L. (1987). The role of imagery in information processing: Review and extensions. *Journal of Consumer Research*, 13(4), 473–491. <https://doi.org/10.1086/209082>
- Marczak, M., & Sorokowski, P. (2018). Emotional connectedness to nature is meaningfully related to modernization. Evidence from the Meru of Kenya. *Frontiers in Psychology*, 9, 1789. <https://doi.org/10.3389/fpsyg.2018.01789>
- Martin, L., White, M. P., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, well-being and pro-environmental behaviours. *Journal of Environmental Psychology*, 68. <https://doi.org/10.1016/j.jenvp.2020.101389>
- Masterson, V. A., Stedman, R. C., Enqvist, J., Tengö, M., Giusti, M., Wahl, D., & Svedin, U. (2017). The contribution of sense of place to social-ecological systems research: A review and research agenda. *Ecology and Society*, 22(1). <https://doi.org/10.5751/ES-08872-220149>
- McCarter, J., Sterling, E. J., Jupiter, S. D., Cullman, G. D., Albert, S., Basi, M., Betley, E., Boseto, D., Bulehite, E. S., Harron, R., Holland, P. S., Horning, N., Hughes, A., Jino, N., Malone, C., Mauli, S., Pae, B., Papae, R., Rence, F., ... Filardi, C. E. (2018). Biocultural approaches to developing well-being indicators in Solomon Islands. *Ecology and Society*, 23(1). Retrieved from <https://www.jstor.org/stable/26799068>
- Metro-Roland, M. M., & Soica, S. (2019). Landscape and tourism. In P. Howard, I. H. Thompson, E. Waterton, & M. Atha (Eds.), *The Routledge companion to landscape studies* (2nd ed.). Routledge, Taylor & Francis Group.
- Milgin, A., Nardea, L., Grey, H., Laborde, S., & Jackson, S. (2020). Sustainability crises are crises of relationship: Learning from Nyikina ecology and ethics. *People and Nature*, 2(4), 1210–1222. <https://doi.org/10.1002/pan3.10149>
- Millenium Ecosystem Assessment (MA). (2005). *Ecosystems and human well-being: Synthesis*. Island Press.
- Mostafanezhad, M., & Norum, R. (2019). The anthropocenic imaginary: Political ecologies of tourism in a geological epoch. *Journal of Sustainable Tourism*, 27(4), 421–435. <https://doi.org/10.1080/09669582.2018.1544252>
- Nelson, K. A. (2009). *Young minds in social worlds: Experience, meaning, and memory*. Harvard University Press.
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, 41(5), 715–740. <https://doi.org/10.1177/0013916508318748>
- Nogué, J., & Wilbrand, S. M. (2017). Landscape identities in Catalonia. *Landscape Research*, 43(3), 443–454. <https://doi.org/10.1080/01426397.2017.1305344>
- Ortony, A., Clore, G. L., & Foss, M. A. (1987). The referential structure of the affective lexicon. *Cognitive Science*, 11(3), 341–364. https://doi.org/10.1207/s15516709cog1103_4
- Pascua, P., McMillen, H., Ticktin, T., Vaughan, M., & Winter, K. B. (2017). Beyond services: A process and framework to incorporate cultural, genealogical, place-based, and indigenous relationships in ecosystem service assessments. *Ecosystem Services*, 26, 465–475. <https://doi.org/10.1016/j.ecoser.2017.03.012>
- Pascual, U., Balvanera, P., Díaz, S., Pataki, G., Roth, E., Stenseke, M., Watson, R. T., Başak Dessane, E., Islar, M., Kelemen, E., Maris, V., Quaa, M., Subramanian, S. M., Wittmer, H., Adlan, A., Ahn, S. E., Al-Hafedh, Y. S., Amankwah, E., Asah, S. T., ... Yagi, N. (2017). Valuing nature's contributions to people: The IPBES approach. *Current Opinion in Environmental Sustainability*, 26–27, 7–16. <https://doi.org/10.1016/j.cosust.2016.12.006>
- Perkins, H. E. (2010). Measuring love and care for nature. *Journal of Environmental Psychology*, 30(4), 455–463. <https://doi.org/10.1016/j.jenvp.2010.05.004>
- Petersen, E., Fiske, A. P., & Schubert, T. W. (2019). The role of social relational emotions for human–nature connectedness. *Frontiers in Psychology*, 10, 2759. <https://doi.org/10.3389/fpsyg.2019.02759>
- Raymond, C. M., Giusti, M., & Barthel, S. (2018). An embodied perspective on the co-production of cultural ecosystem services: Toward embodied ecosystems. *Journal of Environmental Planning and Management*, 61(5–6), 778–799. <https://doi.org/10.1080/09640568.2017.1312300>

- Raymond, C. M., Singh, G. G., Benessaiah, K., Bernhardt, J. R., Levine, J., Nelson, H., Turner, N. J., Norton, B., Tam, J., & Chan, K. M. A. (2013). Ecosystem services and beyond: Using multiple metaphors to understand human-environment relationships. *BioScience*, 63(7), 536–546. <https://doi.org/10.1525/bio.2013.63.7.7>
- Restall, B., & Conrad, E. (2015). A literature review of connectedness to nature and its potential for environmental management. *Journal of Environmental Management*, 159, 264–278. <https://doi.org/10.1016/j.jenvman.2015.05.022>
- Robertson, M., Lawrence, R., & Heath, G. (Eds.). (2015). *Experiencing the outdoors: Enhancing strategies for well-being*. Sense Publishers. <https://doi.org/10.1007/978-94-6209-944-9>
- Rodaway, P. (1994). *Sensuous geographies: Body, sense and place*. Routledge.
- Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, 76(5), 805–819. <https://doi.org/10.1037/0022-3514.76.5.805>
- Russell, R., Guerry, A. D., Balvanera, P., Gould, R. K., Basurto, X., Chan, K. M. A., Klain, S., Levine, J., & Tam, J. (2013). Humans and nature: How knowing and experiencing nature affect well-being. *Annual Review of Environment and Resources*, 38(1), 473–502. <https://doi.org/10.1146/annurev-environ-012312-110838>
- Schore, A. N. (2003). *Affect dysregulation & disorders of the self* (1st ed.). W.W. Norton.
- Soga, M., Evans, M. J., Cox, D. T. C., & Gaston, K. J. (2021). Impacts of the COVID-19 pandemic on human-nature interactions: Pathways, evidence and implications. *People and Nature*, <https://doi.org/10.1002/pan3.10201>
- Sterling, E., Ticktin, T., Kipa Kipa Morgan, T. É., Cullman, G., Alvira, D., Andrade, P., Bergamini, N., Betley, E., Burrows, K., Caillon, S., Claudet, J., Dacks, R., Eyzaguirre, P., Filardi, C., Gazit, N., Giardina, C., Jupiter, S., Kinney, K., McCarter, J., ... Wali, A. (2017). Culturally grounded indicators of resilience in social-ecological systems. *Environment and Society*, 8(1). <https://doi.org/10.3167/ares.2017.080104>
- Stokowski, P. A. (2002). Languages of place and discourses of power: Constructing new senses of place. *Journal of Leisure Research*, 34(4), 368–382. <https://doi.org/10.1080/00222216.2002.11949977>
- Strauss, A., & Corbin, J. (1994). Grounded theory methodology: An overview. In N. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (pp. 273–284). Sage Publications.
- Switalski, M., & Grêt-Regamey, A. (2021). Operationalising place for land system science. *Sustainability Science*, 16(1), 1–11. <https://doi.org/10.1007/s11625-020-00827-5>
- Swyngedouw, E. (2010). Impossible sustainability and the post-political condition. In M. Cerreta, G. Concilio, & V. Monno (Eds.), *Making strategies in spatial planning* (pp. 185–205). Springer. https://doi.org/10.1007/978-90-481-3106-8_11
- Sze, J., & London, J. K. (2008). Environmental justice at the crossroads: Environmental justice at the crossroads. *Sociology Compass*, 2(4), 1331–1354. <https://doi.org/10.1111/j.1751-9020.2008.00131.x>
- Tassin, J. (2020). *Pour une écologie du sensible*. Odile Jacob.
- Teff-Seker, Y., & Orenstein, D. E. (2019). The 'desert experience': Evaluating the cultural ecosystem services of drylands through walking and focusing. *People and Nature*, 1(2), 234–248. <https://doi.org/10.1002/pan3.28>
- Thien, D. (2017). Emotional geographies. In D. Richardson, N. Castree, M. F. Goodchild, A. Kobayashi, W. Liu, & R. A. Marston (Eds.), *International encyclopedia of geography: People, the earth, environment and technology* (pp. 1–5). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781118786352.wbieg1088>
- Tschakert, P., Ellis, N. R., Anderson, C., Kelly, A., & Obeng, J. (2019). One thousand ways to experience loss: A systematic analysis of climate-related intangible harm from around the world. *Global Environmental Change*, 55, 58–72. <https://doi.org/10.1016/j.gloenvcha.2018.11.006>
- Tuan, Y. (1974). *Topophilia: A study of environmental perception, attitudes, and values*. Prentice-Hall.
- Valdivia Díaz, M. (2017). *Servicios ecosistémicos culturales relacionados con el ecoturismo en la cuenca del río Mariño, Apurímac, Perú* (Master's thesis). Universidad Nacional Agraria La Molina. Retrieved from <http://repositorio.lamolina.edu.pe/handle/UNALM/3013>
- Valle Díaz, F. R. (2020). Potencial de los recursos turísticos como oportunidad de recuperación económica en la región Apurímac, Perú, frente al Covid-19. *Ciencia Latina Revista Científica Multidisciplinar*, 4(2), 298–323. https://doi.org/10.37811/cl_rcm.v4i2.79
- Vallet, A., Locatelli, B., Barnaud, C., Makowski, D., Quispe Conde, Y., & Levrel, H. (2020). Power asymmetries in social networks of ecosystem services governance. *Environmental Science & Policy*, 114, 329–340. <https://doi.org/10.1016/j.envsci.2020.08.020>
- Wali, A., Alvira, D., Tallman, P. S., Ravikumar, A., & Macedo, M. O. (2017). A new approach to conservation: Using community empowerment for sustainable well-being. *Ecology and Society*, 22(4). <https://doi.org/10.5751/ES-09598-220406>
- Wall-Reinius, S., Prince, S., & Dahlberg, A. (2019). Everyday life in a magnificent landscape: Making sense of the nature/culture dichotomy in the mountains of Jämtland, Sweden. *Environment and Planning E: Nature and Space*, 2(1), 3–22. <https://doi.org/10.1177/2514848619825988>
- Williams, K., & Harvey, D. (2001). Transcendent experience in forest environments. *Journal of Environmental Psychology*, 21(3), 249–260. <https://doi.org/10.1006/jevps.2001.0204>
- Wilson-Mendenhall, C., & Barsalou, L. (2016). A fundamental role for conceptual processing in emotion. In L. F. Barrett, M. Lewis, & J. Haviland-Jones (Eds.), *The handbook of emotions* (4th ed., pp. 547–563). Guilford Press.
- Woodhouse, E., Homewood, K. M., Beauchamp, E., Clements, T., McCabe, J. T., Wilkie, D., & Milner-Gulland, E. J. (2015). Guiding principles for evaluating the impacts of conservation interventions on human well-being. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 370(1681), 20150103. <https://doi.org/10.1098/rstb.2015.0103>
- Wyn, J., Cuervo, H., & Landstedt, E. (2015). The limits of well-being. In K. Wright & J. McLeod (Eds.), *Rethinking youth well-being* (pp. 55–70). https://doi.org/10.1007/978-981-287-188-6_4
- Zimbardo, P. G., Johnson, R. L., & McCann, V. (2012). *Psychology: Core concepts* (7th ed.). Pearson.
- Zylstra, M. J., Knight, A. T., Esler, K. J., & Le Grange, L. L. L. (2014). Connectedness as a core conservation concern: An interdisciplinary review of theory and a call for practice. *Springer Science Reviews*, 2(1–2), 119–143. <https://doi.org/10.1007/s40362-014-0021-3>

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How to cite this article: Pramova, E., Locatelli, B., Valdivia-Díaz, M., Vallet, A., Quispe Conde, Y., Djoudi, H., Colloff, M. J., Bousquet, F., Tassin, J., & Munera Roldan, C. (2022). Sensing, feeling, thinking: Relating to nature with the body, heart and mind. *People and Nature*, 4, 351–364. <https://doi.org/10.1002/pan3.10286>