

Sensing, feeling, thinking

Why the body, heart and mind are all important in ecosystem management

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Key messages

- People value ecosystems for the different contributions that they make to human well-being, both material and non-material.
- Non-material contributions, such as those related to identity, sense of place and psychological well-being, have affective, cognitive and sensory dimensions.
- Although overlooked in ecosystem management and research, the affective and sensory aspects are important for connectedness with nature, human well-being, conservation and environmental justice.
- This brief summarizes the main findings of qualitative research in Apurímac (Peru) that explores the affective, cognitive and sensory dimensions of people's ecosystem experiences and imaginaries.
- Understanding the diversity of people's experiences and imaginaries is important for more equitable and sustainable ecosystem management.

"When they sang with their high voices, they evoked another landscape – the rustling of large leaves; the sparkle of cascades tumbling down between bushes and white-flowered cactus; the heavy, tranquil rain falling on the cane fields; the canyons flaming with pisonay flowers, full of red ants and voracious insects."

in *"Deep Rivers"* by José María Arguedas (1911–1969), novelist, poet and anthropologist from Apurímac, Peru.

People value and manage ecosystems for their diverse contributions, both material and non-material, but decision-makers frequently ignore the latter, perhaps because they are difficult to quantify, map and monetize (except for tourism or recreation). In many cases, non-material contributions, such as those related to identity and sense of place, can be even more important for people than material contributions (Elwell et al. 2020). They also have a powerful influence on conservation behaviour and motivation.

Relating to ecosystems

Ecosystems contribute to human well-being in diverse ways. They provide food, timber and other materials, they regulate water and climate, and they protect people from different hazards. The non-material contributions, such as those related to recreation, spirituality, sense of place and mental health, are also known as cultural ecosystem services.

More examples of non-material contributions include supporting a sense of belonging, reducing anxiety, fuelling inspiration, providing aesthetic enjoyment, and contributing to the development and preservation of local knowledge. These contributions are shaped by people's interactions with, and interpretations of, places, localities, ecosystems, and different living and non-living beings. They thus arise from the interrelationships between people and ecosystems, with people constructing non-material values in and through these relationships (Fish et al. 2016).

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People build relationships with ecosystems through interactions and direct experiences with nature and place. These interactions and experiences happen through the senses and result in affective states – emotions and feelings. Such sensory and affective experiences also foster connectedness with nature. Connectedness means feeling interrelated with the rest of nature, to feel part of it, and to have a strong emotional affinity with the non-human world.

People who are connected with nature care more about the environment and generally have strong pro-conservation attitudes (Zylstra et al. 2014). A growing body of research, particularly in industrialized countries and urban areas, also demonstrates the many beneficial effects of direct sensory interactions with nature, such as improved cardiovascular and immune functioning, improved cognitive abilities, increased life satisfaction, greater happiness and vitality, and reduction of anxiety and depression (see Frumkin et al. 2017 for a comprehensive review).

The affective and sensory dimensions of human–nature interactions are important for understanding non-material ecosystem values and for improving connectedness, human well-being and conservation. They are also important for a more ethical and just ecosystem management. But researchers and practitioners concerned with ecosystems and their

non-material contributions have mostly focused on the cognitive dimensions (e.g. how people perceive an environment, what preferences they have for landscapes and scenery, and what values they assign to different ecosystem components) (Mastrángelo et al. 2019).

With this brief, we hope to inspire more sensing and feeling in ecosystem management and research. We summarize the key messages and findings of qualitative research on the affective, cognitive, and sensory experiences and imaginaries related to different landscapes in the Peruvian Andes (for more results from our study, see Pramova et al. 2021).

Understanding experiences and imaginaries

To better understand the personal experiences and imaginaries related to particular landscapes in our study area in the Peruvian Andes, we conducted open discussions prompted by 15 photographs (Figure 1). We talked to seven rural and seven urban dwellers, seven tourists and seven professionals from institutions involved in natural resource management who agreed to discussions with us after being selected randomly. We asked the interviewees to choose five pictures and then talk freely about them.

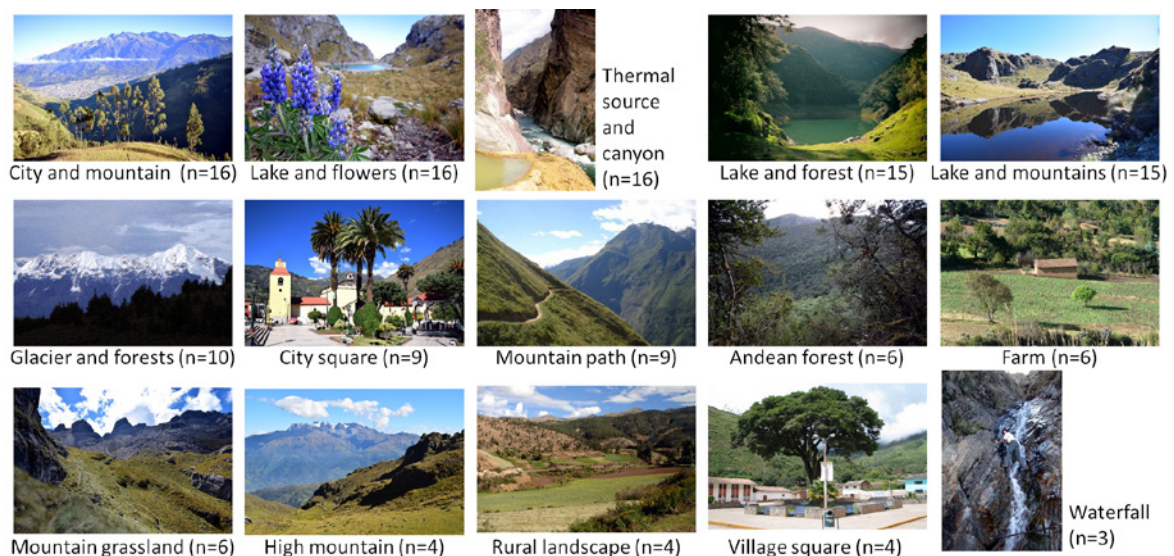


Figure 1. The 15 photographs commented on by the interviewees, sorted by decreasing number of times (n) they were selected.

This research was part of a broader project studying ecosystem services in the Mariño watershed in Apurímac, Peru, particularly in relation to equity (Vallet et al. 2019) and power (Vallet et al. 2020). Like many mountainous areas in the world, our study area is a key provider of multiple ecosystem services (Martín-López et al. 2019) and is subject to rapid changes in ecosystem services (Locatelli et al. 2017).

We recorded 139 descriptions of the pictures and analysed their contents. We coded the relevant pieces of text in the descriptions, using a simple framework with five dimensions covering the affective, cognitive and sensory dimensions, and related settings and activities (Figure 2).

In the framework, **settings** refer to 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). **Activities** refer to physical experiences such as hiking and swimming but also metaphysical and intellectual interactions such as dreaming and imagining.

Sensory experiences relate to the five exteroceptive senses (sight, hearing, smell, taste and touch) and to experiences related to movement (kinaesthetic) and gravity, with perceptions formed by processing and interpreting external stimuli captured by the senses. Although it is difficult to determine where perception stops and cognition begins, for practical analysis, we consider **cognitive experiences** to be conceptual and reflective processes such as thinking. These usually involve values, attitudes, knowledge and beliefs, and include memories, aesthetics, spiritual thoughts, nostalgia or inspiration.

Affective experiences include moods, feelings and emotions along a gradient of good/pleasant to bad/unpleasant. All emotions are affective, but not all affective conditions are emotions. We consider feelings and emotions as affective experiences, recognizing that it is not practical to distinguish between them. It is also important to point out that sensation, emotion and cognition are integrated in experience and it is difficult to determine where one internal process ends and another begins.

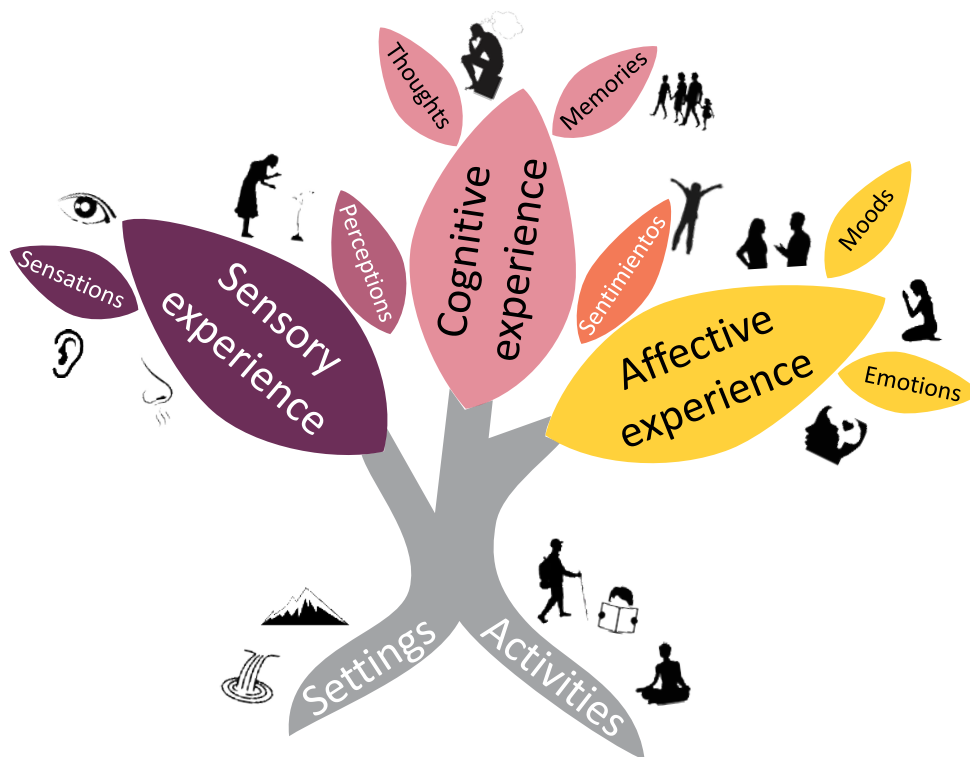


Figure 2. Proposed framework for analysing personal lived experiences related to places, ecosystems or landscapes.

Opening up to the diversity

Our interviewees shared diverse narratives, all rich with symbolism and personal sensory experiences, emotions and memories (Table 1), which they linked with general

beliefs about humans, places and nature. Almost all descriptions included at least one mention of a setting (99%) or a cognitive experience (96%). More than half the descriptions reported a sensory (60%) or affective (55%) experience, whereas activities were mentioned

Table 1. Diversity within the three dimensions of experience in our data

Dimension	Sub-dimension	Definitions or examples
Sensory		
	Gravity	Sensing space and the pull of gravity
	Kinaesthesia	Sensing movement
	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 the protection and well-being provided by nature
	Care of nature	Being 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 the 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

infrequently (30%). The sense of sight was the most frequent sense mentioned. We found a high diversity of cognitive experiences (Table 1), the most frequent being connection to nature. Peace of mind was the most frequent category of affective experience.

Most picture descriptions (81%) included an affective or sensory experience, or both. Only 21% of picture descriptions reported only one of the three experiences (Figure 3).

We were surprised by the many **deep emotions and feelings** that the interviewees shared.

“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”.

We were also surprised by the high **diversity of sensory experiences**, given that the visual prompt involved photographs. Even though the predominant sensory

experience was visual, people talked about touch, hearing, sense of movement and gravity.

“I like the smell of wet soil and the aromatic herbs. I like feeling the humidity of the forest. I like hearing the sounds of birds, insects, my steps or the click of the camera”.

With regards to the cognitive dimension, **reflections on the connection to nature and place** were common in the narratives. Furthermore, the sensory and affective experiences shared by participants implies connectedness to nature and place, as without them connectedness rarely occurs.

“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.”

Peace of mind, or feeling tranquil and comfortingly pleasant, was a frequent affective experience shared.

“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 relaxes me a lot and I like it”.

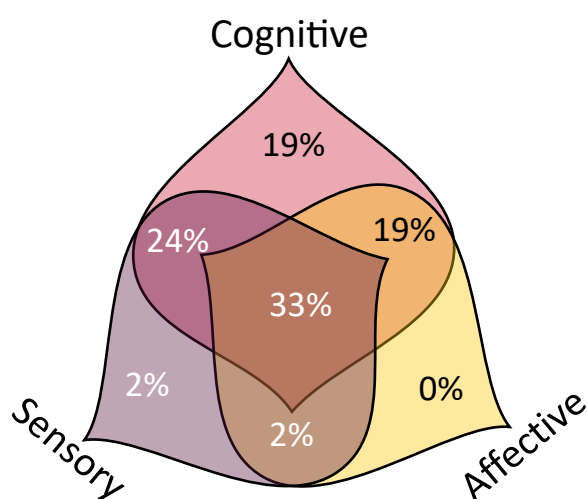


Figure 3. Venn diagram showing the proportion of picture descriptions reporting a sensory, cognitive or affective experience.

Considering equity

As with all ecosystem services, nature’s non-material contributions (and associated cognitive, sensory and affective experiences that are all important for human well-being and conservationist behaviour) are **not accessible to people in an equal way**. Physical and financial capabilities, accessibility, skills and knowledge, perceived rights, confidence, social context and environmental conditions all influence what people are able to do, be and experience.

The recent Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment shows a **stark division** between people who are able to capture the non-material contributions of nature and those who are not (Brauman et al. 2020). For example, the **interest in and ability** to participate in nature tourism has increased for wealthier urban residents, while land use change and rural–urban migration has meant that poor people’s exposure to nature has decreased, leading to **losses of identity and direct experience**.

A study of resource-dependent communities in Chile found that rural communities relying on ecosystem goods (or material contributions) for their livelihoods and spending a lot of time in nature appreciated the outdoors as a place that meets important needs beyond the material (Elwell et al. 2020). In contrast, wage earners appreciated the well-being contributions of ecosystems, 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 recreational places.

A study from Kenya found the opposite results. Rural communities in remote villages and pastoralist settlements were less emotionally connected to nature than urban communities (Marczak and Sorokowski 2018). The authors explained these results by the different contexts of human–nature interactions. Urban residents enjoyed natural landscapes in the context of leisure time and recreation, while the constant contact with nature of the remote rural communities was marked by dangerous wild animals, dry season extreme heat and water shortages, monsoon torrential rains, and other **hardships and risks**.

These **important issues of equity** need greater attention in ecosystem and landscape management to reveal any past and potential losses of direct lived experiences, identity and sense of place. These issues can become particularly salient for ecosystem management related to **conservation and/or ecotourism**.

Towards inclusive governance

Cultural ecosystem services are situated in places, and any action that affects places (including how people experience and interpret them) also affects well-being. Such actions can be a source of justice or injustice. Ecotourism, a popular example of cultural ecosystem services, **can impact the sense of place and human–nature relationships** through branding and place-making, or through powerful institutions establishing landscape meanings and rules. Similar trajectories can occur with conservation initiatives.

Place-making happens by assigning sensations and emotions to particular places and prioritizing specific interactions between people and landscapes (while obscuring other interactions and practices, particularly those of local inhabitants). This can lead to difficult and unequitable ecosystem and landscape management

negotiations. **Incorporating the diversity of people’s lived experiences of place and nature** – sensory, emotional, cognitive – in land use decisions can lead to more inclusive landscape management and to enhanced conservation and human well-being outcomes.

Improving interventions and accessibility

Sensations and emotions are basic mechanisms through which people connect with ecosystems and nature and should be valued along with the more cognitive ways of relating to ecosystems. Different sensations and emotions, as well as values, beliefs and attitudes, all **influence the links between ecosystems, human well-being, connectedness with nature and place, and environmentally responsible behaviour (itself enhanced by connectedness)** (Zylstra et al. 2014; Frumkin et al. 2017).

Sensory engagement is a prerequisite for positive affective and cognitive states to arise, as well as for connectedness. It is not enough for people to spend time in nature; they also need to **notice and appreciate** nature to build connectedness and to realize physiological, psychological and social benefits. Ecosystem managers can encourage such engagement and make it more accessible.

At the local scale, even small interventions can **improve accessibility**. These can be, for example, hedges of native trees and shrubs, edible forest gardens, simple infrastructure such as a bench highlighting a lookout point, and other prompts or cues for sensory, emotional and cognitive engagement (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.

Understanding why, how and when people notice and engage with nature and ecosystems can thus be useful in designing and evaluating such interventions. **Exploring differences in experiences and imaginaries** based on social-demographic characteristics, social and environmental conditions, activities, personal capabilities, values or time spent in nature are important topics for future research. Future research may also examine different contributions of nature to well-being and their perceived importance against these differentiating characteristics and contextual factors.

Recommendations

- Decision-makers should encourage more deliberative and participatory decision-making. Tools such as social multi-criteria evaluation (SMCE) can be used to compare and discuss land use alternatives against multiple criteria and subjective well-being indicators that reflect the lived experiences, imaginaries and values of diverse actors.
- The biocultural approach to conservation and ecosystem management (which emphasizes the cultural practices that influence and are influenced by land- and seascapes) is another useful approach for incorporating diverse human–nature experiences, interactions and values.
- Landscape planning and interventions could also focus on encouraging sensory and affective engagement with nature while considering the capabilities of different groups and improving the accessibility of nature’s non-material contributions to human well-being.
- Toolkits and guidelines, such as the ‘5 ways to be closer to nature’ by the National Trust and the University of Derby in the United Kingdom (Richardson 2017), can be modified and tailored to also suit contexts in non-Western countries.
- Qualitative research with minimal issue framing can bring important insights towards these goals and potentially give a voice to marginalized groups and experiences.

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