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Relational values shape people's connectedness to nature in a former military protected area of Ecuador

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Summary

Relational values are a way of recognizing and valuing the complex and interconnected relationships between people and nature, such as caregiving, place attachment and spiritual meaning, as well as the social and cultural impacts of degradation and environmental and conservation efforts. However, the implications of these values for the management and conservation of protected areas are little known. We explored the role of relational values in shaping local communities' connectedness to a protected area of Ecuador that had been used by the military in the past and the implications of the values for well-being. Four hundred individual face-to-face surveys in the surroundings of Arenillas Ecological Reserve (south-west Ecuador) indicated high levels of connectedness towards this natural reserve amongst local communities through multiple values of nature. However, relational values were identified as the most prominent value explaining the strength of connectedness to nature, followed by intrinsic and instrumental values. We also showed that combinations of different natural values (instrumental, intrinsic and relational) might explain the support for specific well-being components. Our findings offer understanding of human behaviour towards protected areas with a military past and represent a first step in Ecuador towards comprehending how relational values shape the connectedness of local communities to nature.

Introduction

Protected areas (PAs) constitute a major global effort to preserve nature and its biodiversity. Traditionally, their principal purpose has been to preserve iconic landscapes and seascapes, charismatic species and their habitats and biodiversity hotspots. Over the past few decades, countries worldwide have made significant efforts to establish new PAs at multiple spatial scales, and there is a political goal to protect 30% of the planet by 2030 (CBD 2020). Currently, 16.64% of land and inland water ecosystems and 7.74% of coastal waters and oceans have been globally designated as PAs (UNEP-WCMC & IUCN 2021). However, efforts to set aside new lands for conservation are compromised by the globally rising demand for agricultural and forestry commodities, creating trade-offs between lands dedicated to conservation versus food production (Smith et al. 2010). For instance, developing countries in South America have among their priorities the reduction of poverty and the supply of food and commodities to their citizens. Thus, the conservation of PAs is not a top priority for some governments (López-Rodríguez & Rosado 2017), yet developing a tourism industry based on PAs represents a golden opportunity for developing countries to grow their economy. This is the case for Ecuador, which has excellent conditions to become an important PA-based tourist destination because it is one of the most biodiverse countries in the world.

However, global biodiversity loss continues at an unprecedented rate (IPBES 2019), and there is ongoing debate about the contribution of PAs to biodiversity conservation and human well-being (Pullin et al. 2013). Many PAs contribute positively to the conservation of habitats and species (e.g., Feng et al. 2021), but some fail to protect biodiversity due to inappropriate management (e.g., Wauchope et al. 2022). Among the factors influencing the successful management of PAs are the lacks regarding the social inclusion of a wide diversity of local actors in management, sound policies and legislation, sustained investment and resources, development of individual and institutional capacities (Borrini-Feyerabend et al. 2013), scientific and technical support (Wauchope et al. 2022) and cooperation across science, policy and society at different levels (López-Rodríguez et al. 2015).

PA management needs to incorporate the concerns and needs of society (Borrini-Feyerabend et al. 2013). In particular, the establishment of PAs must ensure attention is given to the rights, livelihood needs and conservation capacities and contributions of people living in and around PAs, which is not always the case (O'Riordan & Stoll-Kleemann 2002). For instance, Andrade

and Rhodes (2012) showed that PAs often fail to integrate important aspects of surrounding local communities in their management, such as cultural and traditional heritage aspects. One reason for this is that participatory mechanisms do not often fully enable stakeholders to engage with PA conservation decision-making (Andrade & Rhodes 2012). When this bias happens, the negative perceptions or attitudes of local communities towards conservation are reinforced, thus creating conservation conflicts (Engen et al. 2019). This highlights the importance of developing inclusive management practices for PAs, as they can shape local people's attitudes and values towards nature conservation (Bragagnolo et al. 2016, Abukari & Mwalyosi 2020, Raymond et al. 2022).

Conservation efforts may exist beyond PAs. Areas such as sacred or spiritual sites considered by locals as 'homes of the ancestors' (Lowman & Sinu 2017, Plieninger et al. 2020) and military areas with access barred for security reasons (Borrini-Feyerabend et al. 2013) contribute greatly to achieving the 2030 conservation target. Although these areas were not primarily designed or created for conservation purposes, they have traditionally not been subjected to human pressures and intense activities such as logging, agriculture and urban sprawl (Mascia et al. 2015). Therefore, they play a potentially important role in meeting conservation goals. Communities living near PAs often react with positive or negative attitudes depending on the benefits they obtain (Abukari & Mwalyosi 2020), the maintenance of livelihoods (Dewu & Roskaft 2018) and the rights gained in relation to the costs associated with conservation regimes (Borrini-Feyerabend et al. 2013). Incorporating local communities' perceptions and diversity of values towards nature into PA management can help minimize conservation conflicts (Iñiguez-Gallardo et al. 2018). Three value types constitute ways of exploring how local people interact with nature (De Vos et al. 2018). Instrumental values of ecosystems refer to the utilitarian values that are often measured in monetary terms (Chan et al. 2016). By contrast, intrinsic values give value to the ecosystem for the simple fact of existing, without considering the economic benefits that can be obtained from them, and they are often represented as moral duties (Arias-Arévalo et al. 2018). Relational values are determined by relationships with nature (Chan et al. 2016) and the responsibility of people for nature that derives from these relationships; they are expressed through elements such as individual identity, stewardship, social cohesion, cultural identity or local identity (Klain et al. 2017). Relational values are important to human–nature connectedness (HNC; Roldán & Latorre 2021, Riechers et al. 2022); however, there is no understanding of how the diverse values of nature shape people's connection to nature or how this connection might be modulated by access to nature, yet this can shed light on the long-term success of conservation targets in PAs. This study explores the role of relational values in shaping local communities' connectedness to a PA in Ecuador that was subject to military use in the past and the implications for the communities' well-being. We used social sampling to characterize the level of nature connectedness of communities surrounding the PA to examine the diverse values of nature in shaping their connectedness to nature, and we explore how nature's values support different components of local communities' well-being.

Materials and methods

Study area

Arenillas Ecological Reserve (AER) is 13 527.49 ha in area is located in south-western Ecuador (Fig. 1; Espinosa et al. 2016). It was established in 2012 (IUCN category Ia; IUCN 2008) and has since been managed by the Ministry of Environment, Water and Ecological Transition (MEWET 2015). In 1971, AER was owned by the Ecuadorian Armed Forces and was designated 'El Oro Military Reserve' because of its strategic location between Peru and Ecuador (RELCOM 2023). During the military mandate, this area was characterized by flows of people, trade in goods and illegal activities between the two countries (Espín Baquero 2016). After that, in 1998 it was placed under the custody of the Ecuadorian government as a Military Ecological Reserve.

AER includes the global biodiversity hotspots of Tumbes–Chocó–Magdalena and the tropical Andes (Mittermeier et al. 2005, MEWET 2021), which harbour several endemic bird species and high ecological diversity and provide multiple ecosystem services for maintaining human well-being (SNAP 2015, Molina et al. 2016). AER harbours diverse ecosystems such as the low forest and deciduous shrub (56.26% of the AER area), lowland deciduous forest (30.16%), mangroves (12.08%) and riparian lowland grasslands (1.50%; Fig. 1; SNAP 2015). The climate has alternating wet (January–June) and dry seasons (Székely et al. 2016).

There are 10 local communities with a total human population of c. 6140 people living in the AER surroundings (Fig. 1). The two largest communities are the 'Chacras', with 1500 people living in the low forest and shrubland ecosystem (Molina-Moreira & Alava 2019), and the 'La Cuca', with 1500 people living in the northern mangrove ecosystem. While economic activities are banned within AER, agricultural practices, fishing, timber extraction, shrimp farming, brick-making and informal tourism are allowed in the surrounding areas. Agricultural practices are dominant (e.g., short-cycle crops such as corn and rice) along with aquaculture and livestock. These activities negatively impact the secondary dry forest and mangrove ecosystems by altering the natural water flow through the human-made walls and canals of shrimp farms (Molina-Moreira & Alava 2019). Deforestation driven by timber extraction is a major conservation threat to AER, which has the second-highest deforestation rate in Ecuador (i.e., 6274 ha/year; MEWET 2015).

Social sampling strategy and questionnaire design

A survey campaign was administered during summer 2020 (Fig. 1). Using the online Sample Size Calculator from Survey Software, we concluded that a sample size of 400 respondents was sufficient, with a confidence interval of 95% and a margin of error of less than 5% (Castro et al. 2016). The sampled population was selected semi-randomly by quota in an effort to represent the heterogeneity of the local population (Castro et al. 2016, Quintas-Soriano et al. 2018). Data were collected through semi-structured face-to-face interviews with local people in the diverse populated centres of the study area. Individuals were randomly selected from the most populated areas, selecting these 10 sites as sampling points in AER (i.e., La Pitahaya, La Cuca, San Pedro, Palmales, El Progreso, Quebrada Seca, Carcabon, Guabillo, Balsalito and Chacras; Fig. 1). We interviewed a total of 400 participants distributed across the study area. At each site, respondents over the age of 18 years were randomly selected from public areas (such as main squares, bars or streets) and invited to answer questions that were developed in Spanish based on previous studies of social perceptions (Castro et al. 2016, Quintas-Soriano et al. 2018, 2023, El Ghafraoui et al. 2023). The population sample consisted entirely of local residents. All data collected were anonymous, and we explained to respondents that there were no correct answers. Interviewers

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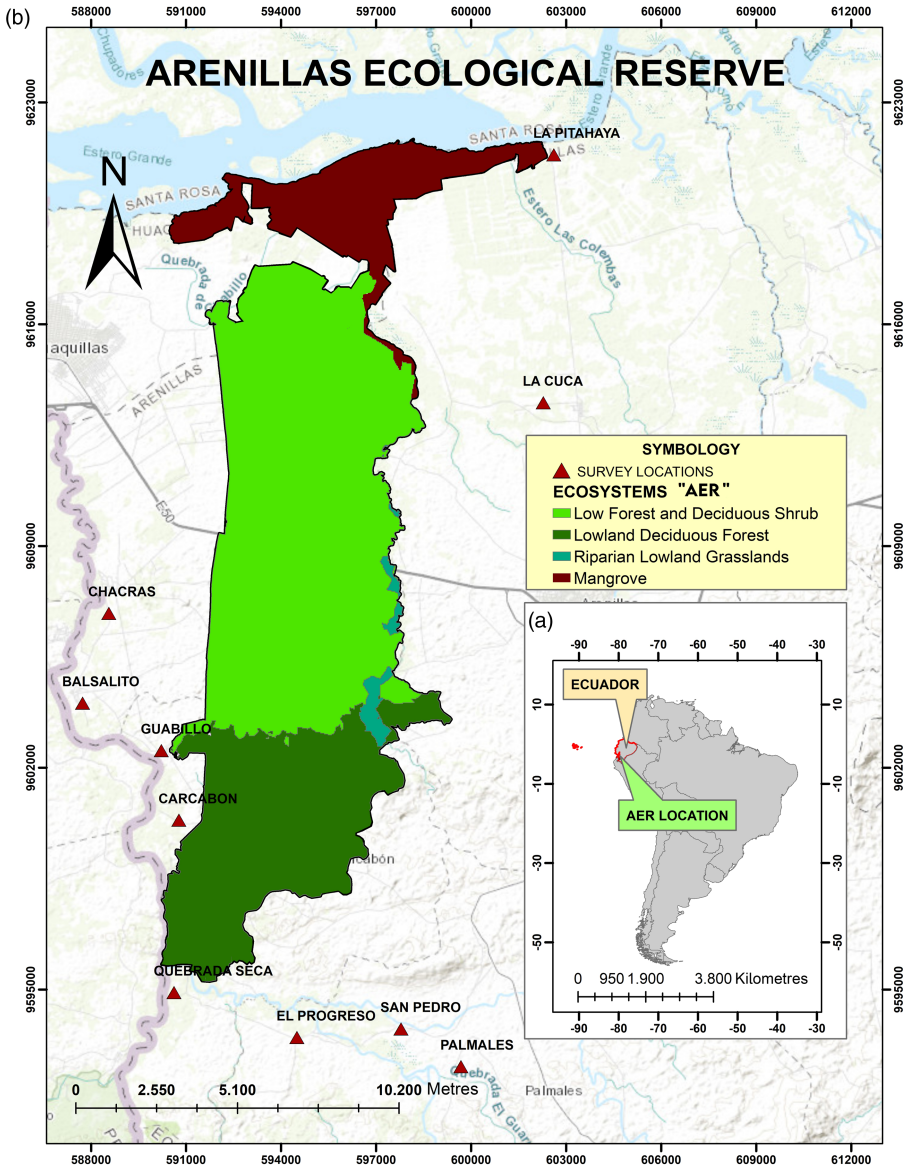

Figure 1. (a) Location of Arenillas Ecological Reserve (AER) in south-western Ecuador and (b) ecosystem types within AER and social sampling points.

followed COVID-19 safety protocols and ethical guidelines from the University of Almería. Before beginning the survey, participants were informed of the objective of the study and the use that would be made of their responses. Informed consent was obtained before any information was collected.

The questionnaire was divided into three sections: (1) HNC towards AER; (2) social perception of AER; and (3) socio-demographic information (Appendix S1). We additionally used a panel with maps and images of the region to improve the understanding of the respondents regarding specific questions (Appendix S2; Quintas-Soriano et al. 2018).

Data processing and analysis

All statistical analyses were carried out using *Excel* 2019 software, and surveys were systematically collected in an anonymized database. During data entry, we verified that the responses to the questionnaire were complete; responses that were incomplete were excluded from analysis.

Human–nature connectedness levels to AER

To explore HNC, we used the 'inclusion of nature in self' (INS) graphical scale of Schultz (2002); this represents 'nature' and 'self' within two circles with various levels of overlap, representing a respondent's connection with nature. We asked respondents to select the level that best described their connection with AER's nature (Pérez-Ramírez et al. 2021, El Ghafraoui et al. 2023, Otamendi-Urroz et al. 2023). Circle associations were presented on a scale from 1 to 5, where 1 = strongly disconnected, 2 = somewhat disconnected, 3 = neutral, 4 = somewhat connected and 5 = strongly connected. The INS scale does not provide a pre-imposed definition of what can be considered as 'nature', so respondents could freely answer based on what they individually understood as AER's nature. We calculated the relative frequencies of each connectedness level and HNC dimension to detect which were dominant in AER.

Values of nature attached to AER

We first categorized all responses of question 1a on 'Why have you chosen this level of HNC?' (Appendix S1) into the three types of

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values of nature, namely instrumental, intrinsic and relational (Chan et al. 2018). Each respondent was asked to freely provide as many arguments as they could as to the reason for their response; they could name more than one type of value of nature. For example, the same person could identify that AER offers spaces to visit the spectacular dry forest bloom (e.g., relational value) and at the same time consider that AER provides spaces to grow crops (e.g., instrumental value). Each response was coded between 0 and 1 for each value type, and the frequencies were depicted in a bar plot. Approximately 187 responses that were not sufficiently clear to be codified were not coded. Following Arias-Arévalo et al. (2017), we also classified responses according to types of articulated values, as concrete expressions of value domains stemming from valuation processes as subcategories within the main value types (i.e., intrinsic, instrumental, relational). We explored the value types associated with different HNC levels through respondents' choices on a specific level of connection to nature (Pérez-Ramírez et al. 2021, Otamendi-Urroz et al. 2023). Relative frequencies were estimated in relation to each value type and across the different levels of HNC and the type of respondents' linkage with the study area.

AER contribution to human well-being of local communities

Human well-being components were explored through an open question about the reasons for visiting AER (question 3a; see Appendix S1). Only 254 respondents who recognized in advance the existence of AER and had previously visited it were considered for this question; responses to this open-ended question were coded and reclassified within the main components of human well-being proposed by Fagerholm et al. (2020), along with the Rogers et al. (2012) classification (Appendix S3). Categorization directly linked words mentioned by respondents with specific categories of human well-being. For instance, those responses related to the environment were reclassified within the main component 'Ecosystems' and subcomponent 'nature'; social interactions were reclassified within the component 'Social relationships' and subcomponent 'social interaction'; productive, labour and recreational activities were considered in the 'Work and leisure' component. Finally, those human well-being components mentioned by respondents that did not fit into the above eight categories were named as 'Others' (see Appendix S3 for further details on the coding classification). We then calculated the relative frequencies of the main categories of human well-being, which were later subdivided into subcomponents of human well-being based on Fagerholm et al. (2020). Relative frequencies were estimated as the percentages of responses and represented in a horizontal bar chart.

To explore relationships between the various types of values previously identified and the components of human well-being, a Sankey diagram was generated (https://sankeymatic.com/build/). We tested the independence between the type of values and the components of human well-being using Fisher's exact test ('fisher.test' function in the *R* statistical package); this provided a yardstick for deciding whether differences in observed percentages between two categorical variables were significant ($p < 0.05$) or simply due to random noise in the data.

Results

Socio-demographic description of the sample

Overall, the number of respondents who were knowledgeable of AER was greater than the number of those who were not (Appendix S4). Some 63% of respondents were male and 37% were female, with an average age of 40 years. Approximately 80% of respondents expressed that they had undertaken a basic level of study (i.e., primary studies), while 12% indicated having undertaken university-level studies. Only 6% of respondents indicated not having undertaken any level of formal education. Regarding the main occupations of respondents, 32% were dedicated to domestic work, while 27% were dedicated to agricultural activities. Finally, regarding time spent outdoors, 49% of respondents indicated spending more than 4 h/day outdoors, while 14% reported spending between 0.5 and 2 h/day outdoors.

Human–nature connectedness levels

Respondents indicated high and very high levels of connectedness towards AER (Fig. 2). Most of the respondents (63%) felt somewhat or strongly connected to AER's nature (58.3% and 67.8%, respectively). Approximately 28% of respondents indicated that they felt neither connected nor disconnected with nature, whereas only 9% of respondents indicated a weak or no connection to nature (6.2% and 11.9%, respectively).

Nature's values underpinning connectedness to nature

When respondents were asked to identify reasons for their connection with AER's nature, 69% of them identified relational values as their main link with the Reserve (Fig. 3a). Instrumental values were mentioned by 28% of respondents, whereas only 3% of the respondents indicated intrinsic values. This result holds when dividing the sample by HNC level (Fig. 3b): 67% of respondents who felt somewhat or strongly connected with nature identified relational values as the main form of interaction with AER. Intrinsic values were only mentioned by those respondents who also felt somewhat or strongly connected with nature, whereas they were not mentioned by respondents reporting other HNC levels.

Respondents expressed various answers that cover the three types of values divided into subcategories (Table 1). Amongst the articulated values that make up relational values, sense of place represented 30% of responses, and respondents linked their answers to their attachment to AER, stating, for example, 'Because I live near the reserve' (respondent #122). Other important articulated values from the relational category were general well-being (9% of responses) and meaningful occupation (9%), referring to the occupations related to biodiversity and ecosystems that allow people to fulfil a 'good human life' (Table 1). Intrinsic values were associated only with 3% of the responses, such as 'Nature is part of our life, without it there would be no clean air' (respondent #332). Finally, instrumental values were associated with 28% of responses and referred to monetary value and how biodiversity and ecosystem contributions to utility were measured through prices, with respondent #54 stating, 'I work in the field, in agriculture.'

Perceived human well-being contributions from AER

The human well-being component that respondents identified as the most supported was work and leisure (61%; Fig. 4a), specifically subcategories such as tourism (26%) and leisure (13%; Fig. 4b). From the education (15%) component, only learning from nature (15%) was mentioned. In the ecosystems component (13%), the most frequent subcomponent was nature (5%). Physical and economic security and agency and political voice were only marginally represented.

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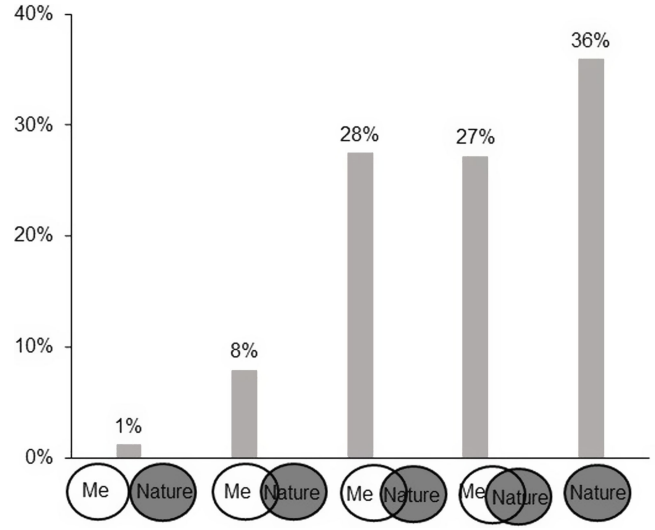

Figure 2. Human–nature connectedness levels in Arenillas Ecological Reserve. The vertical axis represents the percentages of the responses. The horizontal axis represents the levels of human–nature connectedness.

The respondents who identified relational values also showed a preference for the leisure well-being component (37% of respondents; Fig. 5). Secondarily, relational values showed connection with ecosystems (10%) and education (9%). Instrumental values were mostly linked to leisure (12%) and education (5%), whereas intrinsic values were marginally related to leisure (2%) and ecosystems (2%). Respondents' selection of well-being components was not influenced by their preference for the type of values (Fisher's exact test, two-tailed, $p = 0.42$, based on 2000 replicates).

Discussion

Role of relational values in shaping connectedness to nature

Relational values were identified as the basis for local communities' connectedness with the nature of AER. Specifically, our results highlight that AER's local communities value the Reserve through the diverse interactions and relations they form with it, choosing the natural (intrinsic) or economic (instrumental) values less frequently (Chan et al. 2016, De Vos et al. 2018). Despite extensive evidence of the importance of relational values in shaping HNC (Roldán & Latorre 2021, Riechers et al. 2022), this is the first study to show this for the PAs of Ecuador. Since the origin of the relational values concept proposed by Chan et al. (2016), the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) has proposed a new framework to further improve valuation and address barriers to uptaking the incorporation of relational values in conservation and ultimately leveraging transformative changes towards more just and sustainable futures (Pascual et al. 2023). Understanding of the multiple values of nature is crucial to determining why biodiversity loss is still occurring in spite of the conservation efforts that are being made all over the world (IPBES 2022). Our results are corroborated by several other reports of the importance of relational values over intrinsic and instrumental values. For instance, Jax et al. (2018) found that some types of relational value can be connected to the responsibility to care for ecosystems and guaranteeing a healthy natural environment for present and future generations. This finding is particularly important for making

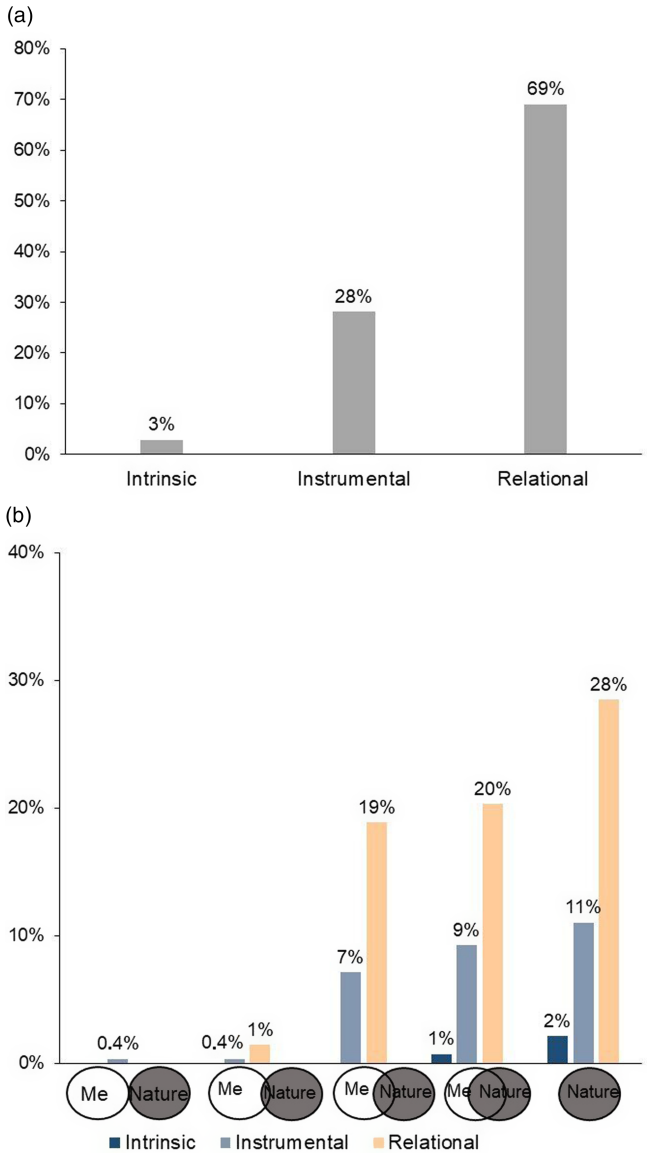

Figure 3. (a) Instrumental, intrinsic and relational values of nature associated with Arenillas Ecological Reserve. (b) Variations in these values across the different levels of human–nature connectedness (based on Pérez-Ramírez et al. 2021) in Arenillas Ecological Reserve. The vertical axis represents the percentages of the responses. The horizontal axis in (b) represents the levels of human–nature connectedness.

visible the emotional links established between people and nature and the moral responsibilities of people towards natural components (Chan et al. 2016), as well as to motivate people to exercise equity and justice and feel a sense of belonging to natural areas (Schröter et al. 2020).

However, despite recognizing the multiple ways in which people think about, value and behave towards nature, we acknowledge that the accounting of relational values is not free of biases, and questions exist regarding the conceptual and pragmatic worth of this new category of nature's value (Feucht et al, 2023). For instance, a study in Chile demonstrated that relationality is inherent to held, instrumental and intrinsic values (Luque-Lora, 2023). Since values arise from different interactions between individuals and nature, thus making possible the conjugation of several values attached to nature, we acknowledge the difficulty of distinguishing relational values and argue that the

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Table 1. Type of value associated with the articulated values proposed by Arias-Arévalo et al. (2017). Absolute frequency (n), relative frequency (%) and examples of quotes about human–nature connection from the local communities sampled in Arenillas Ecological Reserve are shown.

Type of value	Articulated value	n	%	Examples of quotes
Intrinsic	The value of nature, ecosystems or life	6	2%	'[Nature] is part of our life, without it there would be no clean air' (#332) 'Because nature is part of the life of being' (#87)
	Moral duties towards other organisms and ecosystems	2	1%	'For helping nature' (#54) 'Because nature is important to everyone' (#259)
Instrumental	Monetary benefits, economic development	79	28%	'I work in the field' (#207) 'I work in agriculture' (#21) '... without [nature] ... there would be no clean air' (#332)
Relational	Subsistence, means of subsistence	11	4%	'I work with nature and use the mangrove' (#232)
	Mental and physical health	1	0.4%	'Nature provides us with greater health' (#373)
	Identity	10	4%	'My parents are peasants. I like the field' (#67)
	Sense of place	84	30%	'Because I live near the reserve' (#122)
	Symbolic value	11	4%	'Because nature is everything to us' (#275)
	General well-being	26	9%	'I live in a rural area, where you can breathe fresh, pollution-free air' (#334)
	Meaningful occupation	25	9%	'Because I work in fishing and I try to protect it' (#153) 'I work in the field' (#207)
	Altruism	15	5%	'Because I like trees and I take care of them' (#181) 'Because I don't pollute the environment and I don't throw garbage either' (#267)
	Aesthetic	7	2%	'Because nature is beautiful' (#222)
	Recreation, leisure	4	1%	'Because I love to travel' (#397)

values that people assign, form or develop in and with nature can be multiple and simultaneous (Stålhammar & Thorén 2019). We believe that our results demonstrate that multiple values of nature can be identified simultaneously and can be used to obtain a deeper understating of the multiple ways in which people connect with and value nature (El Ghafraoui et al. 2023).

Past military use may influence the intrinsic and instrumental value of AER

Although our results do not directly show how AER's past military use explains the limited role of intrinsic and instrumental values in shaping the connectedness of local communities with nature in AER, research in other regions may offer ways to interpret it. AER was declared in 1971 as 'El Oro Military Reserve' and in 1998 as a Military Ecological Reserve. In 2012, it was declared as an Ecological Reserve by the Ecuadorian Ministry of the Environment in order to preserve these ecosystems in perpetuity (Briceño et al. 2016).

Former military PAs may have significant implications for conservation, both positive and negative, which in turn may translate into changes in the diverse values that people hold with and in nature (Briceño et al. 2016).

Intrinsic value of AER is often related to the natural, cultural or spiritual worth of the region, but our results indicated that local communities did not identify AER's inherent beauty, biodiversity or cultural significance as explaining their connection with nature. This is perhaps due to the former military activities in AER that resulted in increased deforestation, the destruction of sensitive habitats and a limited ability of local communities to access AER. Additionally, we argue that almost 30 years of military management influenced and limited the general knowledge of local communities about this Reserve and about the dry forest that dominates the south of AER. Muñoz et al. (2019) found negative attitudes amongst local people towards the intrinsic value of a PA in a northern European forest. The limited role of instrumental value found in shaping connectedness to AER might also be explained by poor conservation practices during its past military use, which shaped the perception of this Reserve as a restricted-access site due to patrolling activities by customs personnel to control smuggling (Briceño et al. 2016).

Community perception of well-being associated with AER

Our results showed that leisure was recognized as by far the most important well-being component supported by AER. Well-being and derived physical and psychological benefits are often linked to recreational activities in nature (Ocelli Pinheiro et al. 2021). Duku et al. (2022) highlighted that local people recognized access to employment opportunities related to fishing, agriculture and gathering firewood to be the most critical components provided by nature.

In contrast, Hori and Makino (2018) identified components such as food, housing, clothing or access to goods as more important than employment or recreational activities. People's perceptions regarding well-being are evidently context-dependent and influenced by their environment and local setting (Beauchamp et al. 2018). For example, people living in a high-stress environment might place a higher value on mental health, whereas those living in rural areas might prioritize access to fresh food or firewood. For the case of local communities surrounding AER, our findings indicated a strong preference for leisure. The military past of this PA, which involved restrictions on access, may have caused local communities not to perceive it as a source of food, housing or goods. However, the declaration in 2012 of AER as a new PA might have promoted local people to engage in outdoor activities such as hiking, camping or fishing, which in turn might impact on their overall health and well-being. For instance, the COVID-19 pandemic showed how spending time in natural settings provided a sense of connection to nature and provided opportunities for individuals to connect with others and build a sense of community (Almeida et al. 2023).

Community engagement for management of and decision-making regarding AER

We show for the first time how relational values can shape interactions between nature and human well-being as perceived by

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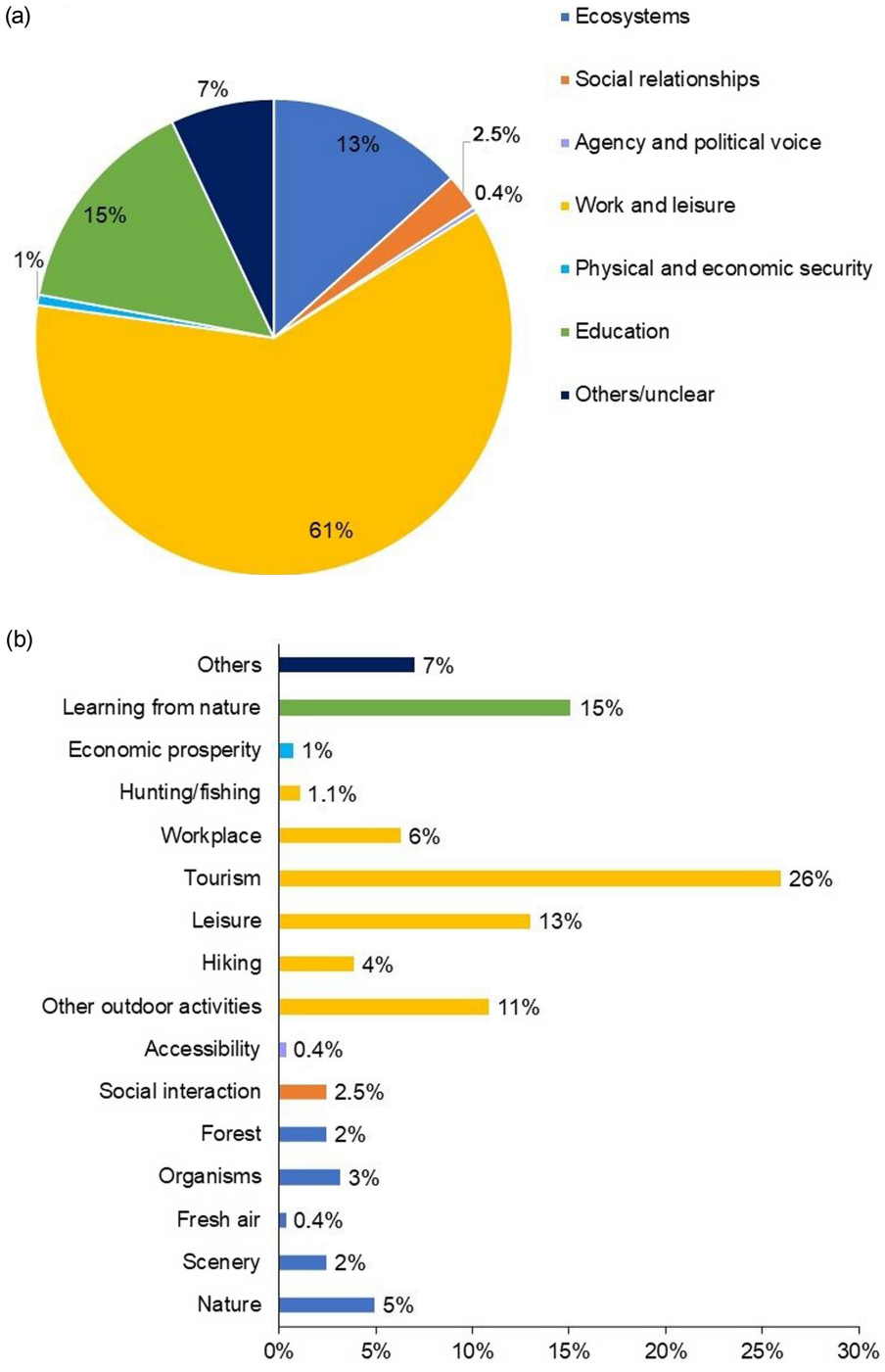

Figure 4. Components of human well-being reinforced by visiting Arenillas Ecological Reserve: (a) the seven main categories of well-being and (b) stated relative importance of subcategories of well-being.

local communities in AER, and this finding could encourage AER's decision-makers to enhance social participation and engagement and to make visible the community's values attached to AER.

This could serve as a first step towards framing and designing conservation communication strategies by the management committee of AER (the consultative body promoting the participation and cooperation of representatives of public and private sectors with a stake in AER) to achieve conservation targets (MEWET 2017). Since people differ in how they interact with nature, opening up participatory governance processes to various stakeholders that represent different value orientations or knowledge systems is increasingly advocated (IPBES 2022). Inclusive public participatory processes can facilitate stronger and longer-term outcomes in conservation (Andrade & Rhodes 2012, Htay et al. 2022, Inoue et al. 2022). In addition, involving communities in the management process of a PA requires environmental education and the development of local projects that achieve benefits both for the community and for conservation (Fonseca et al. 2022, Ortiz & Bastidas 2023). We argue that stakeholder pluralism in AER management can be beneficial in various ways, including exchange of knowledge and generating dialogue to reflect on and learn about conservation challenges in PAs. It could create new understandings about problems and solutions in AER management, build capacity to promote well-informed people and

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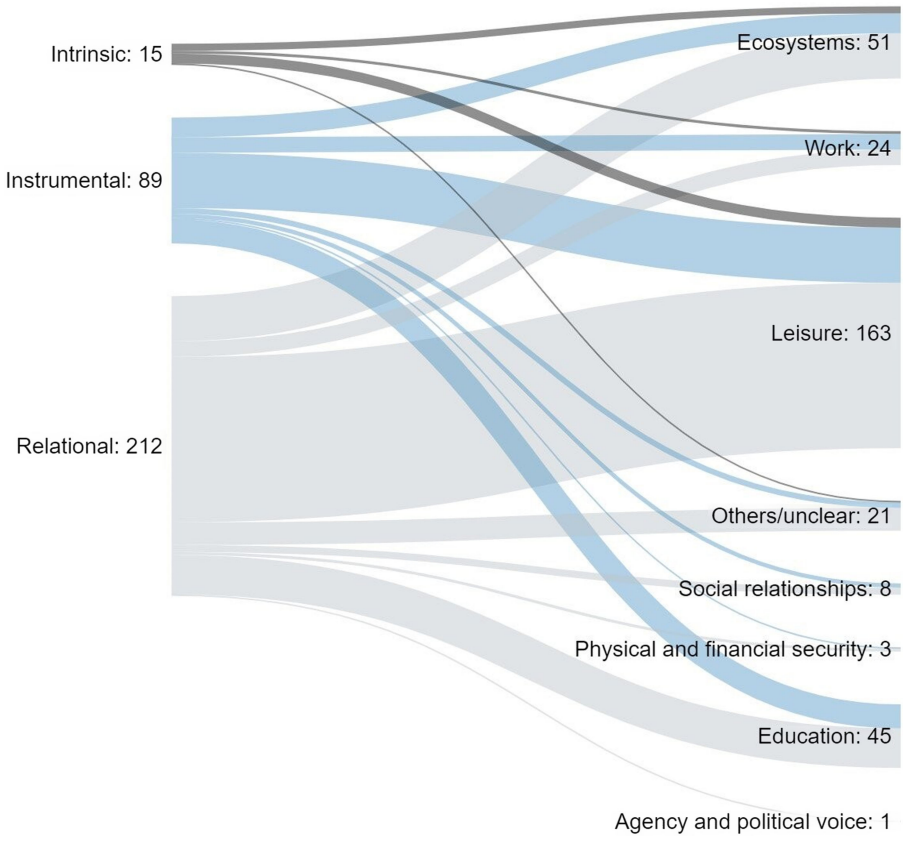

Figure 5. Sankey diagram showing the links between value types and main components of human well-being. The thickness of a flows proportional to the number of responses that involved a value type and a human well-being component. The absolute frequencies of each value and component are shown separately.

facilitate democratic participation and promote innovative action (López-Rodríguez et al. 2020). In Yucatán, upon being involved in the management of the area, and motivated by the relational values derived from their connection with nature, local communities created a support network to strengthen care and promote environmentally friendly practices, with the communities being the protagonists of such change (López Barreto & Pinkus Rendón 2020).

Conclusions

We demonstrate the role of relational values in shaping community connectedness to nature in the AER in Ecuador, where intrinsic and instrumental values were much less important, perhaps related to the past military use of this PA. We argue that conservation efforts should be established on the basis of participatory actions that capture and integrate the multiple values that communities assign, form or develop in and with nature.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S0376892923000322.

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References

Abukari H, Mwalyosi RB (2020) Local communities' perceptions about the impact of protected areas on livelihoods and community development. *Global Ecology and Conservation* 22: 1–12.

Almeida I, Lopes C, Pedroso R, Gaspar R (2023) The outdoor nature, indoors: relationship between contact with nature, life satisfaction and affect during a COVID-19 pandemic lockdown. *PsyEcology* 14: 123–158.

Andrade GSM, Rhodes JR (2012) Protected areas and local communities: an inevitable partnership toward successful conservation strategies? *Ecology and Society* 17: 1–16.

Arias-Arévalo P, Gómez-Baggethun E, Martín-López B, Pérez-Rincón M (2018) Widening the evaluative space for ecosystem services: a taxonomy of plural values and valuation methods. *Environmental Values* 27: 29–53.

Arias-Arévalo P, Martín-López B, Gómez-Baggethun E (2017) Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems. *Ecology and Society* 22: 1–15

Beauchamp E, Woodhouse E, Clements T, Milner-Gulland EJ (2018) 'Living a good life': conceptualizations of well-being in a conservation context in Cambodia. *Ecology and Society* 23: 1–17.

Borrini-Feyerabend G, Dudley N, Jaeger T, Lassen B, Pathak Broome N, Phillips A, Sandwith T (2013) *Governance of Protected Areas: From Understanding to Action: Developing Capacity for a Protected Planet*. Best Practice Protected Area Guidelines Series No. 20 (IUCN, ed.). Gland, Switzerland: International Union for Conservation of Nature.

Bragagnolo C, Malhado ACM, Jepson P, Ladle RJ (2016) Modelling local attitudes to protected areas in developing countries. *Conservation and Society* 14: 163–182.

Briceño J, Iñiguez-Gallardo V, Ravera F (2016) Factors that influence the appreciation of ecosystem services of the dry forests of southern Ecuador. *Ecosystems* 25: 46–58.

Castro AJ, Vaughn CC, Julian JP, García-Llorente M (2016) Social demand for ecosystem services and implications for watershed management. *JAWRA: Journal of the American Water Resource Association* 52: 209–221.

CBD (2020) Estimation of resources needed for implementing the post-2020 Global Biodiversity Framework. Preliminary second report of the panel of experts on resource mobilization. Convention on Biological Diversity [www document]. URL https://www.cbd.int/

Chan KMA, Balvanera P, Benessaiah K, Chapman M, Díaz S, Gómez-Baggethun E, et al. (2016) Why protect nature? Rethinking values and the environment. *Proceedings of the National Academy of Sciences of the United States of America* 113: 1462–1465.

Chan KMA, Gould RK, Pascual U (2018) Editorial overview: relational values: what are they, and what's the fuss about? *Current Opinion in Environmental Sustainability* 35: A1–A7.

De Vos A, Joana CB, Dirk R (2018) Relational values about nature in protected area research. *Current Opinion in Environmental Sustainability* 35: 89–99.

Dewu S, Røskaft E (2018) Community attitudes towards protected areas: insights from Ghana. *Oryx* 52: 489–496.

Duku E, Dzorgbe Mattah PA, Angnuureng DB (2022) Assessment of wetland ecosystem services and human wellbeing nexus in Sub-Saharan Africa: empirical evidence from a socio-ecological landscape of Ghana. *Environmental and Sustainability Indicators* 15: 1–13.

El Ghafraoui Y, Quintas-Soriano C, Pacheco-Romero M, Murillo-López B, Castro A (2023) Diverse values of nature shape human connection to dryland landscapes in Spain. *Journal of Arid Environments* 216: 105023.

Engen S, Fauchald P, Hausner V (2019) Stakeholders' perceptions of protected area management following a nationwide community-based conservation reform. *PLoS ONE* 14: 1–23.

Espín Baquero AM (2016). National Defense, Conservation and Production. Reflections on the case of the Ecological Reserve [www document]. URL https://dspace.ups.edu.ec/handle/123456789/12583

Espinosa CI, Jara-Guerrero A, Cisneros R, Sotomayor JD, Escribano-Ávila G (2016) Arenillas Ecological Reserve; a refuge of biodiversity or an island of extinction? *Ecosystems* 25: 5–12.

Fagerholm N, Martín-López B, Torralba M, Oteros-Rozas E, Lechner AM, Bieling C, et al. (2020) Perceived contributions of multifunctional landscapes to human well-being: evidence from 13 European sites. *People and Nature 2*: 217–234.

Feng Y, Wang Y, Su H, Pan J, Sun Y, Zhu J, et al. (2021) Assessing the effectiveness of global protected areas based on the difference in differences model. *Ecological Indicators* 130: 1–11.

Feucht V, Dierkes PW, Kleespies MW (2023) The different values of nature: a comparison between university students' perceptions of nature's instrumental, intrinsic and relational values. *Sustainability Science* 18: 2391–2403.

Fonseca G, Arroyo M, Castellanos JA (2022) Environmental governance with an ethnic approach: a management commitment in protected areas in the Colombian Caribbean. *Mexican Magazine Agricultural Sciences* 13: 905–915.

Hori J, Makino M (2018) The structure of human well-being related to ecosystem services in coastal areas: a comparison among the six North Pacific countries. *Marine Policy* 95: 221–226.

Htay T, Htoo KK, Mbise FP, Røskaft E (2022) Factors influencing communities' attitudes and participation in protected area conservation: a case study from northern Myanmar. *Society and Natural Resources* 35: 301–319.

Iñiguez-Gallardo V, Halasa Z, Briceño J, Iniguez-Gallardo V, Halasa Z, Briceño J (2018) People's perceptions of ecosystem services provided by tropical dry forests: a comparative case study in southern Ecuador. In: P Sudarshana, M Nageswara-Rao, J Soneji (eds), *Tropical Forests – New Edition* (pp. 96–113). London, UK: IntechOpen.

Inoue M, Terauchi D, Fujii K, Tsunoda K, Okubo N, Takamura Y, et al. (2022) Understanding local peoples' participation as 'means' and 'ends' in protected areas management: a qualitative study in the heart of Borneo. *Journal of Sustainable Forestry* 41: 386–397.

IPBES (2019) *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (S Díaz, J Settele, ES Brondízio, HT Ngo, M Guèze, J Agard et al., eds). Bonn, Germany: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

IPBES (2022) *Summary for policymakers of the methodological assessment of the diverse values and valuation of nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)* (U Pascual, P Balvanera, M Christie, B Baptiste, D González-Jiménez, CB Anderson et al., eds). Bonn, Germany: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

IUCN (2008) *Guidelines for Applying Protected Area Management Categories. Best Practice Guidance on Recognising Protected Areas and Assigning Management Categories and Governance Types*. Best Practice Protected Area Guidelines Series No. 21 (N Dudley, ed.). Gland, Switzerland: International Union for Conservation of Nature.

Jax K, Calestani M, Chan KMA, Eser U, Keune H, Muraca B, et al. (2018) Caring for nature matters: a relational approach for understanding nature's contributions to human well-being. *Current Opinion in Environmental Sustainability* 35: 22–29.

Klain SC, Olmsted P, Chan KMA, Satterfield T (2017) Relational values resonate broadly and differently than intrinsic or instrumental values, or the New Ecological Paradigm. *PLoS ONE* 12: 1–21.

López Barreto M, Pinkus Rendòn M (2020) Biocultural indicators in environmental management projects. The case of meliponiculture in Yucatán. *Polis* 57: 1–22.

López-Rodríguez F, Rosado D (2017) Management effectiveness evaluation in protected areas of southern Ecuador. *Journal of Environmental Management* 190: 45–52.

López-Rodríguez MD, Castro AJ, Jorreto S, Cabello J (2015) Science–policy interface for addressing environmental problems in arid Spain. *Environmental Science & Policy* 50: 1–14.

López-Rodríguez MD, Castro H, Arenas M, Requena-Mullor JM, Cano A, Valenzuela E, Cabello J (2017) Exploring institutional mechanisms for scientific input into the management cycle of the national protected area network of Peru: gaps and opportunities. *Environmental Management* 60: 1022–1041.

López-Rodríguez MD, Ruiz-Mallén I, Oteros-Rozas E, March H, Keller R, Lo VB, et al. (2020) Delineating participation in conservation governance: insights from the Sierra de Guadarrama National Park (Spain). *Environmental Science & Policy* 114: 486–496.

Lowman MD, Sinu PA (2017) Can the spiritual values of forests inspire effective conservation? *BioScience* 67: 688–690.

Luque-Lora R (2023) The problem of relational values. *Environmental Values* 32: 411–431.

Mascia M, Symes W, Rao M, Carrasco R (2015) Why do we lose protected areas? Factors influencing protected area downgrading, downsizing and degazettement in the tropics and subtropics. *Global Change Biology* 22: 1–11.

MEWET (2015) Management plan for the Arenillas Ecological Reserve. Ministry of Environment, Water and Ecological Transition [www documwnt]. URL https://www.ambiente.gob.ec/

MEWET (2017) Accountability 2017. Ministry of Environment, Water and Ecological Transition [www document]. URL https://www.ambiente.gob.ec/rendicion-de-cuentas-2017/

MEWET (2021) Ministerial Agreement: Expand the limits of the Arenillas Ecological Reserve. Ministry of Environment, Water and Ecological Transition [www document]. URL https://tinyurl.com/2pdrtmdy

Mittermeier RA, Gil PR, Hoffmann M, Pilgrim J, Brooks T, Mittermeier CG, et al. (2005) *Hotspots Revisited: Earth's Biologically Richest and Most Threatened Terrestrial Ecoregions*. Chicago, IL, USA: University of Chicago Press.

Molina N, Valencia N, Pérez J, Lavayen J, Valverde FM (2016) Floristic composition and new records for the Arenillas Ecological Reserve, El Oro-Ecuador. *Investigatio* 8: 111–132.

Molina-Moreira N, Alava L (2019) Use of shelters by bats in the Arenillas Ecological Reserve, El Oro, Ecuador. *Mammalia Aequatorialis* 1: 15–29.

Muñoz L, Hausner V, Brown G, Runge C, Fauchald P (2019) Identifying spatial overlap in the values of locals, domestic- and international tourists to protected areas. *Tourism Management* 71: 259–271.

https://doi.org/10.1017/S0376892923000322 Published online by Cambridge University Press

O'Riordan T, Stoll-Kleemann S (2002) *Biodiversity, Sustainability and Human Communities*. Cambridge, UK: Cambridge University Press.

Ocelli Pinheiro R, Triest L, Lopes PFM (2021) Cultural ecosystem services: linking landscape and social attributes to ecotourism in protected areas. *Ecosystem Services* 50: 1–10.

Ortiz M, Bastidas A (2023) Chachis and Afro-descendant populations: relationship with management and conservation in the Cotacachi Cayapas National Park. *Scientific Journal Findings 8*: 63–71.

Otamendi-Urroz I, Quintas-Soriano C, Martín-López B, Expósito-Granados M, Alba-Patiño D, Rodríguez-Caballero E et al. (2023) The role of emotions in human–nature connectedness within Mediterranean landscapes in Spain. *Sustainability Science* 18: 2181–2197.

Pascual U, Balvanera P, Anderson CB, Chaplin-Kramer R, Christie M, González-Jiménez D, et al. (2023) Diverse values of nature for sustainability. *Nature* 620: 813–823.

Pérez-Ramírez I, García-Llorente M, Saban de la Portilla C, Benito A, Castro AJ (2021) Participatory collective farming as a leverage point for fostering human–nature connectedness. *Ecosystems and People* 17: 222–234.

Plieninger T, Quintas-Soriano C, Torralba M, Mohammadi Samani K, Shakeri Z (2020) Social dynamics of values, taboos and perceived threats around sacred groves in Kurdistan, Iran. *People and Nature* 2: 1237–1250.

Pullin AS, Bangpan M, Dalrymple S, Dickson K, Haddaway NR, Healey JR, et al. (2013) Human well-being impacts of terrestrial protected areas. *Environmental Evidence* 2: 1–41.

Quintas-Soriano C, Brandt JS, Running K, Baxter CV, Gibson DM, Narducci J et al. (2018) Social-ecological systems influence ecosystem service perception: a Programme on Ecosystem Change and Society (PECS) analysis. *Ecology and Society* 23: 1–18.

Quintas-Soriano C, Torralba M, García-Martín M, Plieninger T (2023) Narratives of land abandonment in a biocultural landscape of Spain. *Regional Environmental Change* 23: 144.

Raymond C, Cebrián-Piqueras M, Andersson E, Andrade R, Schnell A, Battioni Romanelli B, et al. (2022) Inclusive conservation and the Post-2020 Global Biodiversity Framework: tensions and prospects *One Earth* 5: 252–264.

RELCOM (2023) Latin American and Caribbean Network for the Conservation of Bats. Arenillas Ecological Reserve [www document]. URL https://tinyurl.com/2lmfkpsv

Riechers M, Martín-López B, Fischer J (2022) Human–nature connectedness and other relational values are negatively affected by landscape simplification: insights from Lower Saxony, Germany. *Sustainability Science* 17: 865–877.

Rogers DS, Duraiappah AK, Antons DC, Munoz P, Bai X, Fragkias M, Gutscher H (2012) A vision for human well-being: transition to social sustainability. *Current Opinion in Environmental Sustainability* 4: 61–73.

Roldán M, Latorre S (2021) Social valuation of ecosystem functions of streams in Quito, Ecuador. *Revibec: Ibero-American Journal of Ecological Economics* 34: 65–85.

Schröter M, Başak E, Christie M, Church A, Keune H, Osipova E, et al. (2020) Indicators for relational values of nature's contributions to good quality of life: the IPBES approach for Europe and Central Asia. *Ecosystems and People* 16: 50–69.

Schultz PW (2002) Inclusion with nature: the psychology of human–nature relations. In: P Schmuck, WP Schultz (eds), *Psychology of Sustainable Development* (pp. 61–78). Boston, MA, USA: Springer.

Smith P, Gregory PJ, Van Vuuren D, Obersteiner M, Havlík P, Rounsevell M, et al. (2010) Competition for land. *Philosophical Transactions of the Royal Society B: Biological Sciences* 365: 2941–2957.

SNAP (2015) Description of the Arenillas Ecological Reserve. National System of Protected Areas [www document]. URL http://areasprotegidas.ambiente.gob.ec/

Stålhammar S, Thorén H (2019) Three perspectives on relational values of nature. *Sustainability Science* 14: 1201–1212.

Székely P, Székely D, Armijos-Ojeda D, Jara-Guerrero A, Cog&acaron;lniceanu D (2016) Amphibians of a tropical dry forest: Arenillas Ecological Reserve, Ecuador. *Ecosystems* 25: 24–34.

UNEP-WCMC, IUCN (2021). Protected Planet Report 2020. UNEP-WCMC and IUCN [www document]. URL https://livereport.protectedplanet.net/chapter-1

Wauchope HS, Jones JPG, Geldmann J, Simmons BI, Amano T, Blanco DE, et al. (2022) Protected areas have a mixed impact on waterbirds, but management helps. *Nature* 605: 103–107.

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