Going Beyond the Instrumental View on Nature and the Human–Nature Relationship: Visions of Nature of the Metropolitan Population of Lima, Peru

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Abstract

We explore how human–nature connection and well-being in an urban context relate to nature in general, but with special attention to "values" of nature beyond the immediate city settings. We apply the "visions of nature" framework through a quantitative survey ($N = 362$) held among the citizens of Lima, Peru to better understand their ideas, values, and images of relationships with nature. To achieve this, our research questions are as follows: (1) Which "images of nature" do residents of metropolitan Lima distinguish, and what level of naturalness do they attribute to them?, (2) Which types of "values of nature" do Lima residents acknowledge and adhere to the most?, and (3) Which "images of human–nature relationships" do residents of Lima identify as the most appropriate? Furthermore, we explore whether well-being is reflected in values attributed to nature. We found images of both wild and domesticated nature, which different groups of respondents assigned with divergent levels of naturalness. Differences appear to be linked to respondents' generational contexts and life experiences. The images of relationship that most respondents adhered to (Practical and Ecocentric steward) entail a sense of responsibility toward nature, motivated by the traditional instrumental values but certainly also by intrinsic and relational values of nature. We argue that citizens adhering to those images of relationship experience a form of nature connection with nature beyond the urban context and recommend that well-being research should not only address the significance of nearby urban nature, but also of extra-urban nature. Key Words: Human–nature connection—Relational values—Intrinsic values—Values of nature—Citizen's nature perspectives

Introduction

Imagine people in an urban community, jogging or strolling through a nearby park, but they know nature elsewhere is dying, let us say deforestation in the Amazon. Does that affect their well-being? It has been widely documented that nature is good for physical and mental health (Bell, Westley, Lovell, & Wheeler, 2017; Frumkin et al., 2017; Korn et al., 2018; Roberts, Thomas, Pidgeon, & Henwood, 2021). However, these studies tend to focus on assessing the relationship between well-being and nearby nature, such as urban parks or recreational areas; in other words, nature where urban dwellers are frequently present in or looking at.

However, as similarly argued by Lumber, Hunt, Richardson, and Harvey (2017), there is also another nature people experience and connect to, namely nature outside the daily context, nature that people are not or nearly not in contact with or exposed by, but of

which it is known that it is out there. These are the landscapes, plants, and animals that people may have never encountered, and possibly never will, but which do affect how they think about nature, value it and consider their relation to it.

As such, the way we think and feel about nature "out there" may also contribute to human–nature connection and well-being. This matter is especially relevant for urban populations, who might experience limited to no contact with extra-urban nature in their day-to-day lives. In addition, Latin American countries perform poorly in well-being and development indicators compared with their world-wide income category peers (OECD, 2019, p. 70), meaning their urban citizens may have fewer opportunities to experience nature through recreation and holidays; therefore, there is added value in this study.

The importance of recognizing how people relate to nature extends to well-being and happiness (Capaldi, Dopko & Zelenski, 2014; Richardson, Cormack, McRobert, & Underhill, 2016). In the context of this study we consider well-being as people's evaluations of what is meaningful or important in their lives (Diener & Tay, 2015; Lovell, 2018). This is also sometimes referred to as eudaimonic well-being, which is associated to "functioning well" aspects of well-being such as feelings of meaningfulness, purpose in life or personal growth (Pritchard, Richardson, Sheffield, & McEwan, 2020; Ryan, Huta & Deci, 2008).

Visions of nature framework

In the past two decades, studies based on the visions of nature framework have been performed in The Netherlands, Poland, France, Germany, and most recently in Vietnam. In these studies different types of relationships of people and nature as well as environmental values and ideas about nature in lay people's minds underlying these relationships were investigated (De Groot, 1999; Duong & Van den Born, 2019; Hunka, De Groot & Biela, 2009; Van den Born, Lenders, De Groot, & Huijsman, 2001). Unlike philosophical reflections on the matter, visions of nature studies approach the meanings of human–nature relationships empirically and find practical implementation in, for instance, nature planning and management, nature communication strategies, and environmental policies (Van den Born et al., 2001).

The visions of nature framework comprises the study of three main components: *images of nature, values of nature,* and *human–nature relationships* (Van den Born et al., 2001; Van den Born, Lenders, & De Groot, 2006). In studying *images of nature* it is explored what different types of nature people adhere to and what they consider "real" nature and why. According to De Groot (2012), the level to which nature is seen as "real" nature is influenced by the absence or presence of humans, the level of autonomy of natural processes (biogeochemical cycles, species life cycles, etc.) and the degree of wildness. Previous empirical studies (Buijs & Volker, 1997; Van den Born et al., 2001) have revealed different types of images of nature such as "the elements," "wild nature" (for instance, the sea), "arcadian nature" (e.g., landscapes with sheep pastured in meadows), and "domesticated nature" (covering livestock and crops).

The second component of visions of nature refers to the *values of nature*, which embraces the idea of importance that people confer to nature (Duong & Van den Born, 2019). According to previous studies (De Groot, 2012; Van den Born et al., 2018; West et al., 2018) types of values of nature may comprise instrumental, intrinsic, and relational values. Freshwater supply, carbon capture or crop pollination, for instance, benefit people physically and, therefore, have instrumental (utilitarian) value. Intrinsic value of nature is described as the value nature has of its own, irrespective of its utility to people (Arias-Arévalo, Martín-López & Gómez-Baggethun, 2017; Lockwood, 1999; Regan, 1981; Rolston, 1975).

With reference to relational values of nature, these arise from "meaningful experiences" and relations between humans and nature, such as care and connectedness (Chan et al., 2016; Knippenberg, De Groot, Van den Born, Knights, & Muraca, 2018; Neuteleers, 2020; West et al., 2018). Relational values are also understood as "eudaimonic values" because they are connected to a life that makes a difference in the world or worthwhile living and, therefore, include values as motivating or driving action for nature (Eser, Neureuther, Seyfang, & Muller, 2014; Ryff & Singer, 2008; Van den Born et al., 2018). In addition, relational values have been identified as important for leading a "meaningful life" (Neuteleers, 2020), a dimension of well-being.

Finally, the third component of visions of nature identifies the *images of human–nature relationship*. Images of the human–nature relationship have been advanced in environmental philosophy, as shown in Table 1. Based on these philosophical images, visions of nature research has developed survey statements (De Groot, 2012; Van den Born et al., 2001) that can be used to empirically elicit people's idea about the appropriate human–nature relationship. One example of a statement for surveying images of relationship is "*Human beings have the responsibility to conserve the natural environment*" (De Groot, 2012).

Environmental philosophy divides the images of human–nature relationships in two broad categories: *anthropocentric* and *ecocentric* (Thompson & Barton, 1994). Anthropocentric images are predominantly related to the functional aspect of nature, in terms of what can be obtained from nature, for instance: "*Human beings have the right to alter nature to what they want*" (Duong & Van den Born, 2019). Ecocentric images on the other side recognize that humans are merely a small part of nature (Van den Born, 2006).

Table 1. Human–Nature Relationship Classifications

PASSMORE (1974)	BARBOUR (1980)	ZWEERS (1989)	DE GROOT (1992)	KOCKELKOREN (1993) (EIGHT CATEGORIES)	KOCKELKOREN (1993) (FOUR CATEGORIES)	VAN DEN BORN, LENDERS AND DE GROOT (2006)	DE GROOT (2012)	BRAITO ET AL. (2017)	DUONG AND VAN DEN BORN (2019)
Despot	Despot	Despot	Technocrat adventurer	Despot	Master	Master over nature	Mastery over nature	Master User Apathy	Mastery over Nature
		Enlightened master	Manager engineer	Enlighted master					
Stewardship	Steward	Passive steward Active steward	Guardian	Conservative steward Progressive Steward	Steward	Steward of nature	Guardianship of nature	Nature distant guardian Steward	Family with nature Ecocentric image of relationship
		Partner	Partner	Conservative partner Progressive partner	Partner	Active partner with nature Romantic partner with nature	Partnership with nature	Partner	
Nature mysticism	Unity with nature	Unio mystica		Nature mystic	Participant	Participant in nature	Participation in nature	Participant	
		Participant	Participant	Participant					

Adapted from Van den Born, Lenders, and De Groot (2006).

In addition, images of relationship are strongly linked to philosophical, religious, and ethical stances (De Groot, Drenthen, & De Groot, 2011). Different classifications of human–nature relationship have been made by different authors (see Table 1 for an overview). In this study, we follow Kockelkoren's (1993) classification of four basic types of human–nature relationship: *Master*, *Steward*, *Partner*, and *Participant*, also used in previous visions of nature studies (Duong & Van den Born, 2019; Ganzevoort & Van den Born, 2019; Van den Born et al., 2001).

The Master image portraits humankind as standing above nature, as possessor and justified exploiter with the right to alter nature (Braito et al., 2017); detrimental effects of human actions can be overcome by technology and economic growth. The Steward image of nature considers human's role as the guardian of nature—an anthropocentric stance as well—who sees nature as a vulnerable system that needs to be taken care of. Humans as steward of nature have both a religious and a secular version (Van den Born, 2006). In the religious stance humans need to take care of nature because it is entrusted to them by God (or other metaphysical entities), whereas in the secular version humans are primarily committed to take care of nature for future generations (Hunka et al., 2009).

The Partner and Participant images are essentially ecocentric although they differ in the position humans hold toward nature. In the Partnership image, an equal relationship exists between humans and nature, with people displaying many types of horizontal relationships of play, work, and spirituality. Nature and humans are, however, seen as different entities but with equal value (Braito et al., 2017). For the Participant image, nature is seen as the overarching cosmos and all-pervading process of life and humans are merely a part of that, especially in a spiritual sense (Van den Born, 2006).

Research aim

We believe that the visions of nature framework offers an appropriate method to understand people's perspectives on nature, and that there is added value in studying an urban population beyond the northern hemisphere world. As such, we carried out a quantitative investigation among residents of the city of Lima, Peru. Our inquiry is guided by the following research questions, based on the three

components of the visions of nature framework: images of nature, values of nature, and images of the human–nature relationship, respectively:

1. Which "images of nature" do residents of metropolitan Lima distinguish, and what level of naturalness do they attribute to them?
2. Which types of "values of nature" do Lima residents acknowledge and adhere to the most?
3. Which "images of human–nature relationships" do residents of Lima identify as the most appropriate?

Methods

Respondent selection

The target audience for our survey consisted of both men and women >18 years from all educational and economic backgrounds currently living in Lima city, representing the very heterogeneous demographic composition of the city in socioeconomic terms. Sampling was performed within 1 month, from mid-May to mid-June 2017, and resulted in valid responses of 362 participants. We used combined methods to deliver the surveys. First, a convenience sampling approach was used (Etikan, Musa, & Alkassim, 2016), and printed surveys were personally distributed to people in several districts and at different public spaces such as markets and in the streets, as well as at public agencies such as cultural, leisure, and education centers.

Those individuals who agreed to participate in the study completed the survey on their own, either on paper or online. In both formats written instructions were offered to facilitate completing each section of the survey. For elderly participants and those who indicated that they were not familiar with participating in this type of research the instructions were read aloud. Second, a variation of the Snowball method (Corbetta, 2007) was used: people acquainted by the first author who live and work in different districts completed the survey and were asked to distribute the survey (printed or a digital version) to their own contacts (study, work, family, and neighbors).

Although snowballing can mean participants are introduced to the study in a slightly different manner than if they would be contacted by the researcher directly, survey instructions were identical for all participants. In addition, snowball sampling offered the significant advantage of mobilizing personal networks for reaching a larger sample among the Lima population.

Finally, to obtain a close representation of the Lima population according to the National Institute of Statistics and Informatics (INEI, 2018), we also took a subsequent purposive sampling approach: preliminarily analyses of the sociodemographic data from the first survey rounds were taken into account for the selection of additional respondents in such a way that representativeness in our sample was ensured. In the end, sociodemographics of the respondents relate to the general sociodemographics of Lima citizens (INEI, 2018) as follows: in terms of education, 16.6% of the respondents completed the technical level compared with 18.3% of the general population, whereas 32.6% of respondents achieved a university degree in relation to 16.3% of the general population.

The Catholic and Evangelical religions—the two largest religions in the city—were represented by 72.8% and 8.7% of the respondents, respectively, against 76.6% and 10.9% of the general population; 15.4% of the respondents declared not to subscribe to a religion in comparison with 6.4% of the general population. Regarding age, 87.6% of the respondents were between 18 and 64 years, compared with 88.6% of the Lima population being between 15 and 64 years. In terms of gender, females were represented better in the survey sample, namely 55.5% compared with 51.4% of the general population.

In addition, variables such as whether the respondent's parents were born in Lima, the places of birth and childhood, and time of residence in Lima, were included in this study to test potential correlations with visions of nature later (Table 2).

In total 434 surveys were delivered (357 in printed version; 77 digital) of which 386 were returned (88.9% response rate), from which 24 were filtered out due to incompletely filled in questions. A final sample of 362 surveys was included in the analyses reported in this study.

Survey structure

The survey was conducted in Spanish; for an English translation, see Supplementary Appendix SA1. The structure of the survey consisted of three sections and was tested and adapted following a pilot study ($N = 13$; five men and eight women) to ascertain beforehand whether the visions of nature distinguished in European studies (De Groot, 2012; Ganzevoort & Van den Born, 2019; Van den Born et al., 2001; Van Heel, Boerboom, Fliervoet, Lenders, & Van den Born, 2017) were also recognized by Lima citizens.

The first section of the survey was designed for the images of nature, which (following Research Aim section) concerns the types of nature people distinguish and the degree to which they perceive them as "real" nature. Taking into account previous typologies of images of nature (De Groot, 2012; Van den Born et al., 2001) and considering local landscapes, respondents were asked to rank from 1 to 5 the level of naturalness for a series of 12 photographs that

Table 2. Respondents' Demographic Features

AGE GROUPS	*N*	%	GENDER	*N*	%
18–29	134	37.0	Female	201	55.5
30–64	183	50.6	Male	161	44.5
>64	45	12.4			
EDUCATION LEVEL	***N***	**%**	**PARENTS BORN IN LIMA**	***N***	**%**
Primary incomplete	7	1.9	Mother and father	118	33.0
Primary complete	5	1.4	Only father	40	11.2
High school incomplete	10	2.8	Only mother	36	10.1
High school complete	62	17.2	None	164	45.8
Technical incomplete	26	7.2	**TIME OF RESIDENCE IN LIMA**	***N***	**%**
Technical complete	60	16.6	<5 Years	18	5.1
University incomplete	73	20.2	5–10 Years	26	7.3
University complete	85	23.5	11–15 Years	14	3.9
Postgraduate	33	9.1	>15 Years	297	83.7
RELIGION	***N***	**%**	**PLACE OF BIRTH**	***N***	**%**
Catholic	260	72.8	Lima city and Callao	246	69.1
Evangelical	31	8.7	Lima region	6	1.7
None	55	15.4	Other department than Lima	101	28.4
Other religion	11	3.1	Other country than Peru	3	0.8

Missing data for some variables makes total $n < 362$.

represented different types of nature such as "a park," "the sea," "roots emerging from pavement road," and "a rainforest river" (see Supplementary Appendix SA1 for a full overview).

Afterward, respondents were asked to select from a list the criteria they took into consideration when assessing the photographs. These criteria were based on the presence and absence of human intervention, as stated in previous studies (Van den Born et al., 2001) and also the presence of some specific elements displayed in the photos, such as the "presence of water," "presence of livestock," or "resemblance to Andean landscapes."

The second section of the survey included values of nature, for which the respondents were asked to select the reasons that best reflected why they think "nature is important" and whether they think if "humans are part of nature" and "nature as having importance by itself." Based on previous literature (Van den Born et al., 2001) a list of five to eight reasons were presented to the respondents, to pick out up to a maximum of three options that best reflected the values nature has for them (Supplementary Appendix SA1).

The third section presented 21 statements regarding different human stances about their appropriate relationship toward nature based on the four images of relationship (master, steward, partner, and participant).

From this list, 17 statements were taken from previous studies in which statements were allocated to one of the four images of relationships beforehand (De Groot, 2012; Van den Born et al., 2001); examples of such statements are "*we have the right to change nature if society benefits from it*" (master stance), "*our generation has to take care that nature will be preserved for future generations*" (steward stance), "*humans and nature should be treated with equal consideration*" (partner stance), "*we are a small part of nature therefore*

humans future is greatly dependent on its welfare" (participant stance); four additional statements were elaborated according to local environmental issues at national and local city level such as "*I think Íd prefer having more parking lots in the city than illegal mining in the forest to be stopped*" (a full overview of statements is given in Supplementary Appendix SA1).

For each statement respondents could indicate their level of agreement on a 5-point Likert scale: completely disagree, disagree, neutral, agree, and completely agree (Flick, 2011). Finally, at the end of the survey each respondent completed demographic information.

Research ethics. Following institutional proceedings at the time of carrying out the empirical work, considering the design of the research and the target population no formal ethical approval was required. The research was carried out in full adherence with the research data management policy of the Institute for Science in Society to ensure adherence to all relevant ethical principles and guidelines related to data collection and storage. The purpose of the study was explained to potential participants, who then gave informed consent to participate in the study.

Statistical analysis

To uncover the different images of nature and human–nature relationship images through the information collected in the surveys, two principal components analyses (PCA) were performed using SPSS 10. PCA is a technique for grouping variables into overarching dimensions and specifying their contribution to each component (Field, 2009). Exploratory PCAs were carried out, one for each set of items, since this was the first time this set of statements and photographs were used in the Peruvian context.

Owing to expected correlations between the dimensions of images of relationship, as well as between the dimensions representing the images of nature, an oblique rotation method (Oblimin) was used in the PCA (Foster, Barkus, & Yavorsky, 2006, p. 78). The Kaiser–Meyer–Olkin (KMO) value and Bartlett's test of sphericity were examined after running the PCAs to verify the sampling adequacy, with KMO values >0.70 considered adequate and reliable, and Bartlett's test checked for significance (<0.05). In the PCA output a minimum loading value of 0.40 was established to obtain the final sets of coherent items (Field, 2009). Once the factors were identified, reliability of each set of items was verified using Cronbach's α.

For background variable analyses such as gender, age, and place of residence, images of nature and images of relationship mean values were calculated using the simple mean of all items (photographs or statements, respectively) that comprise each factor. Then, the images' mean values were analyzed against the respondents' background variable scores. Since the normality test for the mean scores of these images indicated a non-normal distribution, Spearman's Rho bivariate correlation was selected for scale and ordinal variables (age, education level, and time of residence in Lima). For categorical variables with two groups (i.e., gender) the Mann–Whitney test was used and for categorical variables with more than two groups (e.g., religion) the Kruskal–Wallis test was chosen to first identify where the differences lie among groups, followed by a *post hoc* test to identify the significant differences.

Results

Images of nature

Which "images of nature" do residents of metropolitan Lima distinguish, and what level of naturalness do they attribute to them?

The output of the PCA presented two factors with six items each (Table 3), representing in total 49.3% of the variance, with KMO = 0.798 and Bartlett's test of sphericity <0.001.

The first factor was labeled *wild nature* since it comprises four landscapes associated with wild nature (Andean lake, coastal vegetation desert, tropical forest with river, and open sea), one item of domesticated nature (pine-planted forest) and one item of arcadian nature (marked alpacas grazing on Andean tundra) and altogether obtained a high level of naturalness (4.48) on a scale of 1 to 5 with a reliable Cronbach's α of 0.768. The domesticated and arcadian items, pine-planted forest and the grazing alpacas, obtained the lowest naturalness scores within the factor (Table 3). This factor was all about wider nature since none of its items referred to the types of nature to which Lima citizens are proximate.

The second factor was labeled *domesticated nature* and comprises a series of five photographs with domesticated plant species and the arcadian item "Andean mountains with wild and cultivated areas" (Table 3). This factor obtained a mean level of naturalness of 3.18 and a reliable Cronbach's α of.742. Despite the inclusion of the arcadian item (which received the highest level of naturalness within the factor), the rest of the items are clearly centered around the use of nature by humans.

Respondents most selected criterion when valuing naturalness level of images of nature was "human intervention degree" followed by "quantity of plants and trees" and "proximity/distance to the city" (Table 4).

The analysis of images of nature against demographic variables identified a positive correlation between *time of residence in Lima* and the *wild nature* image ($r = 0.117$, $p < 0.05$). According to this, the longer people have lived in Lima city, the idea of wild nature is more

Table 3. Factor Analysis for Images of Nature

ITEMS	FACTOR LOADING	MEAN DEGREE OF NATURALNESS	STANDARD DEVIATION
Wild nature image			
Andean lake	0.812	4.65	0.838
Coastal vegetation desert	0.810	4.51	0.948
Tropical forest with river	0.739	4.74	0.737
Pine-planted forest	0.625	3.91	1.165
The open sea	0.582	4.79	0.668
Marked alpaca grazing on the Andean tundra	0.483	4.25	0.905
Mean degree of naturalness for wild nature		4.48	
Cronbach's alpha	0.768		
Domesticated nature image			
House "neat garden"	0.794	2.63	1.196
A park	0.737	3.37	1.085
Fieldcrop	0.702	3.53	1.195
Paved path among wild vegetation	0.677	2.81	1.121
Roots emerging from paved path	0.506	2.28	1.116
Andean mountains with wild and cultivated areas	0.460	4.49	0.815
Mean degree of naturalness for Domesticated nature		3.18	
Cronbach's alpha	0.742		

Table 4. Criteria Selected by Respondents as Most Important When Valuing the Naturalness Level of Each Photo (Up To Three Answers per Respondent)

CRITERIA FOR SELECTION OF PHOTO'S NATURALNESS LEVEL	SELECTED	
	N	%
Human intervention degree	245	71.0
Quantity of plants and trees	143	41.4
Proximity/distance to the city	127	36.8
Resemblance to Andean landscapes	90	26.1
Beauty degree	73	21.2
Presence of water	58	16.8
Presence of livestock	20	5.8

prevalent to them. Meanwhile, the image of *domesticated nature* is scored with higher levels of naturalness by younger people, less educated respondents, and those who have lived in the city for a shorter time since bivariate correlations showed negative relationships between this image and *time of residence in Lima* ($r=-0.266$, $p<0.01$), *age* ($r=-0.256$, $p<0.01$), and *education level* ($r=-0.146$, $p<0.01$).

Finally, people who spent time in the countryside during childhood seem to assign a higher level of naturalness to *domesticated nature* than those who did not. Mann–Whitney test output showed that scores for the *domesticated nature* image significantly differ between these two groups of respondents ($U=12{,}740$, $p<0.05$) where the ones who spent time in the countryside exhibit a higher mean rank (185.8) than those who did not (160.2).

Other background variables such as gender, religion, birth place, childhood place, and parents *born in Lima* showed no significant results for these images.

Values of nature

Which types of "values of nature" do Lima residents acknowledge and adhere to the most?

In relation to the importance and values of nature (Table 5), the most ranked answers related to an ecosystem services (ES) stance: "*nature as the habitat of all living beings*" (69.5%), a supporting ES, just above nature's essential conditions as food, oxygen, and water (63.4%), a provisioning ES. The first statement highlights the importance of nature for all living beings, not just humans, which is considered an ecocentric point of view for valuing nature, whereas the second one holds a more functional approach. In addition, "*processes such as soil regeneration and climate regulation*" with 35.2% recognize regulating ES as an important aspect of nature. Arguments that attribute nature importance for human well-being and supporting benefits related to health and quality of life received a support of ~16%.

With reference to the intrinsic value of nature, most respondents consistently identify the importance of nature in relation to what they had answered in previous questions, highlighting first a

Table 5. Respondents Results for Values of Nature

QUESTIONS AND MULTIPLE CHOICE ANSWERS ON VALUES OF NATURE	SELECTED	
	N	%
1. In your opinion, what is nature?		
The Earth with the animals, plants, minerals in their original state	232	64.4
Everything that lacks human intervention	164	45.6
God's creation	118	32.8
The environment in which we live	81	22.8
The place where new forms of life arise	70	19.4
A mysterious energy of high beauty and purity	40	11.1
Everything that grows and flourishes	27	7.5
2. Do you consider humans are part of nature?		
Yes, because we were created as part of nature	218	60.4
Yes, because we are living beings	199	55.1
Yes, because we enjoy it	85	23.5
No, because humans always transform nature	34	9.4
No, because humans destroy nature	27	7.5
Yes, but only primitive tribes or very few communities	15	4.2
3. Do you think nature is important?		
Yes, because it is the habitat of all living beings	251	69.5
Yes, because it provides us with essential living conditions such as food, oxygen, and water	229	63.4
Yes, because environmental processes such as soil regeneration or climate regulation occur inside nature	127	35.2
Yes, because it provides us well-being and quality of life	59	16.3
Yes, because it provides us with raw materials such as timber or medicines to improve life	58	16.1
Yes, because it is the cultural scenery for many human communities	37	10.2
No, because man's works overcome nature	3	0.8
No, because humans can live without it	1	0.3
4. Do you consider nature has importance by itself, without considering its utility for humans?		
Yes, because it benefits nonhuman life such as plants and other animals	278	77.9
Yes, because nature was on Earth before and will be after the human being	171	47.9
No, because it was created with an objective that includes the human being	17	4.8
No, because the continuity of nature depends on human beings	15	4.2
No, because humans are the only ones that attribute value (or importance) in the first place	9	2.5

biodiversity conservation argument (nature as plants and animals) and second, an evolutionary argument (nature existed before humans and will continue long after). In this study, the respondents unquestionably recognize the importance of nature for its own sake and beyond human's existence and contact in time and place.

Human–nature relationships

Which "images of human–nature relationships" do residents of Lima identify as the most appropriate?

From the 21 survey statements, data screening led to the identification of 18 items with loading values >0.40, whereas three items (S8, S9, and S11) were below that limit. Consequently, items S9 "*I think we should consider nature as a good friend*" and S11 "*Human beings are inextricably connected with nature*" were removed for the final rotation. Item S8, however, was kept in the analysis since its factor loading (0.391) approached our benchmark value of 0.40 (Table 6). Finally, a four-factor solution was chosen, representing a total variance of 45.9%.

All items that were beforehand labeled as Master were reproduced as such in the analysis (factor 2: Master image; $\alpha = 0.564$). The other three factors resulted in combinations of items labeled beforehand to the Steward, Participant, or Partner positions. These factors are described below as Ecocentric steward, Spiritual participant, and Practical steward, respectively. The mean level of agreement for all images ranged on a scale from −2 to 2.

The Ecocentric steward (Factor 1) focusses on the idea of equality between people and nature and the duty of humans for securing the welfare of nature and future generations. The five statements within this factor entail two philosophies; first that both humans and nature should be given the same treatment and possibilities to develop, and second, for this development to happen humans are responsible because they are part of nature. Moreover, humans are responsible to take care of nature because of future generations. The factor obtained a reliable Cronbach's alpha ($\alpha = 0.749$) and the second highest mean level of agreement (1.36), with the steward statements especially receiving high scores (Table 6).

The second factor, identified as a Master image, was the only one in this study fully backed up by anthropocentric statements, also labeled beforehand to this image. For instance, Master items state that humans are positioned above nature and are entitled to use it fundamentally for their own benefit. Therefore, economic progress to ensure employment and other direct benefits from nature—such as food harvesting—are privileged over nature conservation. This factor is generally rejected by the respondents with a mean level of agreement of −0.58.

Factor 3 represented statements belonging to the participant image and was named Spiritual participant because of its strong religious dimension. The existence of higher powers related to the role of human in protecting nature is particularly reflected in statements S13 and S16. At the same time, this factor has religious implications, in the sense that human's attitudes toward nature are an obligation toward higher powers. Finally, the item "I feel at one with all life on earth" represents a participant's perspective where humans are a single element of a larger whole—another living being of nature. This factor obtained a moderate level of agreement (0.88).

Finally, factor 4 represented a second steward image labeled the Practical steward. This factor comprised two "decision making" statements (L2 and L3) that were especially designed according to local environmental issues in the city of Lima, which obtained the highest factor loadings. The statements in this factor reflect, on the one hand, on nature in proximity, represented by parks and fauna (L2), and, on the other, on the acknowledgement of human responsibility to take care of nature, represented by sea creatures (L1). At the same time, there is also a practical approach on environmental challenges as a pending agenda for the citizens since respondents acknowledge the importance of the well-being of animals. This factor obtained the highest level of agreement (1.48) in our study.

Relationships between background demographic variables and images of relationship. The analyses using background variables identified several underlying relationships with the Master and Spiritual participant factors only. In general, the higher the age the higher the level of adherence; bivariate correlation (Spearman's Rho) showed a positive correlation between age and adherence to the Master ($r = 0.105$, $p < 0.05$) and the Spiritual participant ($r = 0.181$, $p < 0.01$). In terms of education level, lower education respondents seem to subscribe more strongly to these factors, as indicated by a negative correlation between education level and the Master ($r = -0.407$, $p < 0.01$) as well as the Spiritual participant ($r = -0.128$, $p < 0.05$).

Being born and raised in another department than Lima may have a positive effect on adhering to the Master and the Spiritual participant. Kruskal–Wallis test showed that place of birth and place of childhood significantly differ among respondents for the Master image [$H(3)_{\text{place of birth}} = 10.29$, $p < 0.05$, $H(3)_{\text{place of childhood}} = 10.06$, $p < 0.05$], whereas scores for the Spiritual participant only differ significantly based on place of childhood [$H(3)_{\text{place of childhood}} = 12.44$, $p < 0.01$]. The *post hoc* analysis for the Master image revealed that people who were born or spent their childhood in other (less urbanized) departments than Lima subscribed to this image of

Table 6. Human–Nature Relationship Typology Based on Principal Components Analysis

ITEMS	FACTOR LOADING	MEAN LEVEL OF AGREEMENT	STANDARD DEVIATION	ITEMS	FACTOR LOADING	MEAN LEVEL OF AGREEMENT	STANDARD DEVIATION
ECOCENTRIC STEWARD					**MASTER**		
S1. Humans and nature should be treated with equal consideration (PARTNER)	0.767	1.13	1.038	S2. I think economic progress should be more important for society than nature conservation (MASTER)	0.690	−1.01	1.069
S5. We are part of nature and, therefore, we are responsible to take care of it (PARTICIPANT/ STEWARD)	0.726	1.66	0.678	L4. Laws that promote work places are more important than laws that protect endangered species (MASTER)	0.632	−0.42	1.306
S6. Humans and nature are of equal value (PARTNER)	0.683	1.15	0.961	S7. The ability to think puts humans above nature and therefore humans are entitled to use nature (MASTER)	0.572	−0.28	1.148
S4. Nature should be given the possibility to develop, just like humans (PARTNER)	0.627	1.20	0.800	L1. I think I would prefer having more parking lots in the city than illegal mining in the forest to be stopped (MASTER)	0.526	−0.85	1.282
S3. Our generation has to take care that nature will be preserved for future generations (STEWARD)	0.608	1.67	0.692	S12. We have the right to change nature if society benefits from it (MASTER)	0.524	−0.34	1.145
S8. For nature conservation to sustain, every human being should be actively involved (STEWARD)	0.391	1.37	0.761				
Mean level of agreement to Ecocentric steward		1.36		Mean level of agreement to Master		−0.58	
Cronbach's alpha	0.749			Cronbach's alpha	0.564		
SPIRITUAL PARTICIPANT					**PRACTICAL STEWARD**		
S16. There are higher powers to which we are responsible regarding taking care of nature (STEWARD)	−0.826	0.89	1.079	L3. I think our authorities should invest in better managing the sewage system that goes to the sea for the welfare of the animals that live there (STEWARD)	0.711	1.58	0.827
S17. I feel at one with all life on earth (PARTICIPANT)	−0.768	0.80	0.873	L2. I would like to have more parks and gardens in my district to watch more butterflies, singing birds and other beautiful creatures growing freely (PARTICIPANT)	0.598	1.51	0.649
S13. All living beings are divine creatures (PARTICIPANT)	−0.683	0.79	1.192	S10. Because humans have the ability to think, we should take care of nature (STEWARD)	0.466	1.31	0.780
S14. The relationship of humans with nature defines who we are (PARTICIPANT)	−0.460	1.04	0.874	S15. We are a small part of nature, therefore humans future is greatly dependent on its welfare (PARTICIPANT)	0.409	1.51	0.692
Mean level of agreement to Spiritual participant		0.88		Mean level of agreement to Practical participant		1.48	
Cronbach's alpha	0.732			Cronbach's alpha	0.572		

KMO = 0.792 and Bartlett's test of sphericity <0.001. Items S9 "I think we should consider nature as a good friend" (factor loading ≤0.327) and S11 "Human beings are inextricably connected with nature" (factor loading ≤0.228) were removed during data screening. Originally intended human–nature typologies for each item are given in capitals between brackets. S = statement; L = local concern statement.

relationship more strongly than those born and raised in Metropolitan Lima. Likewise, for the Spiritual participant, people whose childhood took place outside Lima showed a higher support to this image than those who grew up in the Lima department.

In terms of religion, Catholics seem to adhere to the Master image more strongly compared with the "no religion" group [$H(3)_{religion} = 14.33$, $p < 0.01$]. Finally, for the Spiritual participant both the Catholics as well as the Evangelicals seem to exhibit significant differences in comparison with the "no religion" group [$H(3)_{religion} = 16.57$, $p < 0.01$]. According to the *post hoc* analysis, this image was more strongly supported by the Evangelicals ($p < 0.01$) and Catholics ($p < 0.05$) than by people who did not consider themselves to belong to any religion.

Other background variables such a gender and parents born in Lima showed no significant values for these factors. In addition, levels of agreement with the Ecocentric or Practical steward did not significantly differ between demographic groups suggesting a wide distribution of these two images among the sampled population.

Conclusions and Implications

The image of domesticated nature (which in terms of overall score was best represented by an arcadian item) was attributed a higher level of naturalness by those who spent time in the countryside during childhood. This is interesting considering that "human intervention degree" was the most important criterion for respondents when valuing the images' naturalness level, which suggests that even though most respondents may have an idea of intervened nature as being less natural, some domesticated forms of nature still symbolize an important level of naturalness to them. Meanwhile, older respondents assigned a higher level of naturalness to the image of wild nature, which may be influenced by their living memories of a nonurbanized context about six decades ago, when wild nature represented by valleys with riparian vegetation and arcadian elements such as coastal field crops covered large parts of Metropolitan Lima.

Our analysis of images of relationship uncovered different but not exclusive perspectives that citizens have regarding their envisioned relationship to nature, and which revealed some particularities and resemblances from perspectives reported in other countries. Lima citizens mainly subscribed to the Ecocentric and Practical steward images. The Master was a largely rejected image, similar to studies performed in The Netherlands, Germany, and the United Kingdom (Van den Born et al., 2006). Likewise, as seen for images of nature, reactions to some human–nature relationship images can differ based on (demographic) background variables. This study appears to confirm that religious beliefs may play a role in perspectives on nature (Bang, Medin, & Atran, 2007), similar to visions of nature reported from Poland (Hunka et al., 2009).

This pattern was especially noticeable for the images of the Spiritual participant (responsibility toward higher powers and all living beings as divine creatures) and the Master (humans as standing above nature), which were more strongly supported by Catholics and especially Evangelicals compared with those with no religion. In addition, less educated and older respondents subscribed more strongly to the Master and Spiritual participant; it should be noted that most recent national surveys in Peru indicate that education levels tend to be lower among the older population (INEI, 2018). Similar to that in previous studies (Duong & Van den Born, 2019; Ganzevoort & Van den Born, 2019) gender did not reveal itself to be significantly correlated with any image.

Our analysis of values of nature also revealed that the majority of the respondents believe nature holds intrinsic value as well as diverse benefits for humans, such as supportive (i.e., oxygen, food, and water) and regulation services (i.e., climate regulation). These results are characterized by both ecocentric and anthropocentric viewpoints, and align with high levels of agreement to the Ecocentric and Practical steward images (each one comprising a mixed set of steward, participant, and partner statements).

The fact that these perspectives do not appear mutually exclusive is a further indication that people in practice subscribe to more than one image of the human–nature relationship (Flint, Kunze, Muhar, Yoshida, & Penker, 2013; Van den Born, 2008). This high adherence to both images indicates a high level of nature friendliness and interestingly our analyses indicate that support for these images seems to be shared broadly among different demographic groups.

As a further point of reflection with regard to values of nature, "well-being and quality of life" was an argument selected by 16% of respondents as having importance to them. Both the recognition of the intrinsic value of nature and the importance of nature for people's quality of life go beyond the often instrumental view on nature (Van den Born et al., 2018). Moreover, many studies that stress the importance of nature for health often focus on physical health, whereas this study shows that beyond this instrumental value of nature, the relational value of nature, that is, how contact with nature leads to more quality of life, is perceived as a significant factor. Citizens' reflexivity on the impact of nature on their quality of life will still require further enquiry, but we believe the values found in this study provide a baseline to continue deeper analysis on the meaningful life dimension of well-being.

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Authors' Contributions

N.C.M.-M., R.L., and R.v.d.B. conceived the research study, designed the survey and data collection methods; N.C.M.-M. collected the data; W.G. provided statistical guidance; N.C.M.-M., R.L., R.v.d.B., and W.G. contributed to data analysis; although N.C.M.-M. is the main author, R.L., R.v.d.B., and W.G. also contributed to writing of the article. All authors gave final approval for publication.

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Supplementary Material

Supplementary Appendix SA1

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