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Spectrum of concepts associated with the term "biodiversity": a case study in a biodiversity hotspot in South America

Claudia Cerda · Iñigo Bidegain

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Abstract In most conservation programs that include public participation, the word "biodiversity" is used. However, many variables influence the public understanding of the term and determine what biodiversity means to local stakeholders. Those representations of the concept must be addressed and included in conservation actions. We asked 47 local stakeholders in a biosphere reserve (BR) located in a biodiversity hotspot in South America, for whom the conservation of biodiversity is not the main focus of interest, to explain how they understand the term "biodiversity." Twenty-two different definitions were provided, ranging from purely ecological concepts to the human dimension. Although the diversity of animals and plants was the most frequently mentioned concept, the variety of concepts that emerged suggested that more explicit examples of social constructions must be considered in public participatory projects and environmental education programs. Actors living in a close relationship with nature provide a greater diversity of elements in defining biodiversity, visualizing ecological but also instrumental values.

Keywords Biodiversity · Concepts · Social understanding · Biodiversity hotspot · Management

C. Cerda (✉) · I. Bidegain (✉)
Faculty of Forest Sciences and Conservation of Nature, University of Chile, Santa Rosa 11315, La Pintana, Santiago, Chile
e-mail: clcerdaj@uchile.cle-mail: inigo.bidegain@gmail.com

Introduction

The need to include public participation in the design and implementation of conservation actions has been broadly recognized (Christie et al. 2006; Fischer and Young 2007; Durand and Lazos 2008; Berghoefer et al. 2010; Kareiva and Marvier 2012; Cerda et al. 2013a, b, 2014; Fischer et al. 2014; Hartter et al. 2014; Serenari et al. 2015; van Riper et al. 2017), and many social and interdisciplinary scientists have noted the need to assess the way in which members of the public perceive biodiversity-related issues (Hull et al. 2001; Stoll-Kleemann 2001; Kaczensky et al. 2004; Christie et al. 2006; Fischer and Young 2007; Cerda and Losada 2013; Cerda et al. 2014; Zorondo-Rodríguez et al. 2014). Given that the term "biodiversity" is most often used to identify the main object of conservation, the social understanding of this concept matters because social support of conservation may depend on it (Fischer and Young 2007). In this context, the assessment of the public understanding of the term has been recognized as essential for the improved design and implementation of conservation policies (Fischer and Young 2007; Howard et al. 2016). Traditionally, environmental education has been recognized as one of the main instruments (Berghoefer et al. 2010) through which biodiversity conservation concepts are transmitted to the public. However, given that the concept of biodiversity may be differently understood by people and that this understanding may be affected by life experiences, emotional contact with nature, access to formal education, and material interaction with nature (Berghoefer et al.

2010), it is relevant to reflect on how the concept of protecting biodiversity should be transmitted before imposing educational programs on local actors. Several studies have argued that education and communication strategies in biodiversity conservation contexts will be useful only if the richness and variety of people's representations of what biodiversity means to them are addressed (Barkmann et al. 2005; Berghoefer et al. 2010; Buijs and Elands 2013). Therefore, educating the public through the transfer of scientific or technical knowledge on biodiversity may not be enough, and the understanding of different views on biodiversity and its conservation is necessary (Buijs and Elands 2013).

Important research efforts that explicitly assess the public understanding of the concept of biodiversity and its related uses have been conducted in the developed world—mainly in Europe. Areas of Asia, Africa, and Central and South America have biological conservation as a high priority. They present high biodiversity levels and high rates of species loss (Zamin et al. 2010; Velasco et al. 2015) and at the same time present high levels of poverty and social inequality (Holland et al. 2009). For example, in Latin America, biodiversity is at risk due to anthropogenic threats such as deforestation, urbanization, and agricultural abandonment (Carmona et al. 2010). Thus, understanding how the people who live in such areas perceive the importance of biodiversity has become increasingly relevant (Cerda and Losada 2013), but unfortunately, little research on this topic exists for these regions.

This study aims to contribute to the scientific literature by offering a new case study investigating social comprehension of the concept of biodiversity and providing empirical results from a biosphere reserve (BR) located in a biodiversity hotspot of global relevance. BRs are models of living landscapes that correspond to large tracts of land where biodiversity conservation is practiced in conjunction with local people living, working, and striving for sustainable livelihoods (Stoll-Kleemann and O'Riordan 2017). BRs aim to follow the general vision of an "ecologizing society" by offering innovative thinking with regard to socially inclusive environmental management, and they are thus designed as laboratories for research and education. In this sense, an analysis of the social meanings of biodiversity is especially important in BRs, where people's responses to the decline of biodiversity, the actions they take, and their support for conservation measures will depend on their knowledge of biodiversity and associated problems such as threats of extinction (Lindemann-Matthies and Bose 2008) as well as the perceived importance they assign the role of biodiversity in human well-being (Cerda et al. 2007). In BR management, it is practically obligatory to engage in public participation processes to build sustainability scenarios that harmonize the conservation of biodiversity and human well-being (Cerda et al. 2007). For these processes to be legitimate, transparent, and ethical, people must possess an understanding and level of knowledge of biodiversity conservation issues. Conservation key issues may include, for instance, public knowledge of "biodiversity" as an ecological term and the human forces most responsible for its decline (Hunter and Joan 2003). Although it is recognized that conservation issues are increasing in importance for many people (Cerda et al. 2017), the extent of superficial knowledge, the number of misconceptions, and the lack of diverse experiential involvement by citizens are serious limitations to implementing the model of sustainability that BRs aim to achieve. Furthermore, political discourses about conservation and sustainability can be "illegible" at the local level because BR inhabitants find it difficult to see due to their own ideological biases and disinformation (Adger et al. 2001).

We developed the study in the Campana Peñuelas Biosphere Reserve (CPBR) in Central Chile.

The CPBR is located in one of the most important areas of the planet for the conservation of biodiversity, the Chilean Mediterranean Biodiversity Hotspot (Mittermeier et al. 2005). The CPBR is located between the most populated regions of Chile, the Metropolitana and Valparaíso, which together hold almost half the population of the country: approximately 7 million people. This gives the CPBR great importance at the global, national, and regional levels and poses enormous challenges for the achievement of conservation goals, management, and governance. In the CPBR, the main threats to biodiversity are intensive agriculture, forestry, tourism, and rural real estate development (amenity plots or "parcelas de agrado"). This particular peri-urban area is subject to rapid land-use changes, and thus to environmental pressure and degradation, due to its central location between Chile's two largest cities. In addition, forest fires, domestic livestock entering the core zones of the BR, and the illegal extraction of Chilean palm (*Jubaea chilensis*) seeds are significant threats to the area that exacerbate the tensions among the different stakeholders (Pelenc and Velut 2012). This area also

suffers from droughts and desertification (Schulz et al. 2010). Currently, the CPBR faces a political process to implement the BR model in such a way that the BR functions as intended in practice. In such process, biodiversity conservation efforts are not only focused on the core areas of the BR (which are public protected areas), but also particularly focused on buffer and transition zones, which still have an enormous biodiversity value and are critical in the provision of ecosystem services (Moreira and Barsdorf 2014) while simultaneously experiencing the promoted development of more invasive activities. Investigation of the knowledge of people living in the BR about biodiversity and related issues is key to advancing the political process of implementing the BR model. If people living in a BR are to have a voice in such planning processes, they should be fully informed about conservation issues, and therefore the assessment of the social meaning of the biodiversity concept becomes a key issue requiring investigation. Such assessments are useful in our case in (a) identifying those segments of the local population that require greater communication efforts on the importance of conserving biodiversity and (b) identifying which approaches (e.g., utilitarian, ethical, ecological, conservationist) are best suited to convey the importance of biodiversity based on the social meaning of the concept held by local actors. Both of these aspects can ultimately empower local actors living in the BR with regard to conservation issues, as their ways of thinking and reasoning and their forms of living are considered.

The theory of concepts (e.g., Medin 2005) influences our research in the sense that the biodiversity concept as held by individuals can be understood as a complex construct that may include (i) specific terms that label the concept and (ii) definitions of the concept (Fischer and Young 2007). People's own experiences, normative aspects, and information may influence the way in which they describe the concept of biodiversity (Bakhtiari et al. 2014). Our research builds on previous studies that have assessed the social understanding of the term "biodiversity." Research conducted in Europe has shown that the concept is poorly understood, which raises concerns in terms of consulting the public about the issues (Spash and Hanley 1995), and that people generally have poor biodiversity identification abilities (Dallimer et al. 2012). Other studies in the same region have found that people can express rich mental concepts of biodiversity, such as balance, food chains, and human-nature interactions, irrespective of their scientific knowledge (Fischer and Young 2007) and that lay people have an intuitive understanding of ecological concepts such as biodiversity (Bakhtiari et al. 2014). Still, other studies (e.g., Howard et al. 2016) have provided an analysis of the spectrum of arguments associated with the term "biodiversity" as expressed in the literature and emphasized the need to combine these arguments in order to strengthen biodiversity conservation.

Materials and methods

Study area

The Campana Peñuelas BR, located in central Chile (Fig. 1), was created in 1984 (17 thousand ha) and expanded in 2009 (238 thousand ha). The BR is a peri-urban area located between the two most populated regions of Chile, the Metropolitan Region (which includes Santiago and other areas) and Valparaíso, which together contain nearly half the country's population (Moreira and Barsdorf 2014). The two cores of the BR, the Campana National Park and the Peñuelas National Reserve, are public protected areas. The Campana park is recognized as an international icon of the biota conservation of central Chile. The flora of the park consist of approximately 430 native species, of which more than half are endemic to Chile. The abundant vegetation allows for the subsistence of a variety of fauna species (Elórtegui and Moreira-Muñoz 2002). The park is one of the few protected areas of Chile with local endemics represented by unique species with a very narrow range of distribution (Moreira and Barsdorf 2014). The park also protects the typical fauna of central Chile, such as charismatic mammals, amphibians, reptiles, and a great diversity of insects and arthropods, many of which are endemic. The Peñuelas reserve has an area of 9.260 ha, and the vegetation is more intervened than in La Campana because large sections of the reserve are covered by exotic plantations of *Pinus radiata* and *Eucalyptus globulus* (CONAF 2008). The natural vegetation within the reserve is a mixture of sclerophyllous forest and scrub, which forms an important center of faunal and floral diversity and is an ecologically sensitive area (Muñoz-Pedreros et al. 2010). The variety of herbaceous flora in these formations is notable, with over 200 species represented. The degree

of environmental deterioration threatens the diversity within the BR (Muñoz et al. 1996; Smith-Ramírez and Armesto 2005).

The BR has a human population of 124,083. The BR has a management board that gathers regional and local and public and private stakeholders (e.g., representatives of municipalities, the regional delegation of the institute for agricultural development, the chamber of commerce, associations of vineyard, and agricultural landowners) and is coordinated by the Valparaíso regional division of the National Forestry Corporation (CONAF 2008).

This research is part of the multidisciplinary research project "Exploring human-wildlife relationships in Chile: a multi-stakeholder approach to conservation management," funded by the Chilean Science and Technology Commission for the years 2015–2018. The multidisciplinary project focuses on the sociocultural valuation of different species of animals and plants in the Campana Peñuelas BR. The understanding of local actors living in the reserve regarding the concept of biodiversity (which we present here) and the social valuation of ecosystem services are also relevant topics addressed by the project.

Selection of respondents

Aiming to fulfill the objectives of the multidisciplinary project, in January 2016, we conducted in-person semi-structured interviews (explained in the "questionnaire structure" section) with 70 key social actors with different interests in the territory covered by the BR (Table 1). We define key local actors as those who have a strong relevance in decision-making in the area (e.g., local government employees, enterprise owners) and those who have strong interests at stake in local nature management (e.g., small farmers, representatives of local organizations, people working in tourism). We also included a group of educators in schools and colleges as actors who can influence local people's biodiversity valuation on a long-term scale. Of the 70 participants, we focused our attention on actors for whom the conservation of biodiversity is not the main interest and on those whose activities are traditionally seen as being in conflict with conservation interests. This group of actors comprised 47 people.[1] The driver of the sampling strategy was not to obtain a great number of surveys but to search for the maximum variety of opinions, so we were careful to incorporate actors from different cultural groups present in the reserve. The potential participants were identified through key contacts and snowball sampling. They were contacted by the research team by e-mail, by telephone, and in person. In general, their willingness to participate in the study was satisfactory because most of those contacted agreed to participate in the interview. Table 1 presents the groups of included local actors, a description of each group, and the number of people interviewed.

Questionnaire structure

The structure of the questionnaire followed the multiple objectives of the mentioned research project, in which the investigation presented here is framed. The questionnaire included an introductory section that explained the objective of the study: to assess the participants' opinions on the nature of the place. The first section (not presented here) contained questions on preferences for species and perceptions of benefits derived from the ecosystems of the reserve. The next section focused on the understanding of the concept of biodiversity, and we asked the respondents to explain with words or a phrase what they understand it to mean or what they imagine when hearing the word "biodiversity." We used this approach considering that the biodiversity concept as held by individuals can include specific terms that label the concept (Fischer and Young). Similar approaches have been used in other social studies related to biodiversity conservation (Cerda et al. 2013a). Finally, we asked for the sociodemographic characteristics of the participants. All interviews were conducted by three anthropologists with experience conducting surveys in socio-environmental contexts. Prior to the question on the understanding of the concept of biodiversity, technical words such as biodiversity, "conservation," "species," or "ecosystem services" were avoided in the questionnaire.

[1] Given the multiple objectives of the project, we also interviewed 23 local actors for whom biological conservation is the main goal of their activities (i.e., scientists and employees of public protected areas of the BR). Given that actors interested in the conservation of biodiversity are informed about the meaning of the biodiversity concept (Chaucono 2014) and considering that collaborative work for designing and implementing conservation goals in biosphere reserves should be conducted with actors whose activities challenge such goals (Barkmann et al. 2005), we focused our analysis on the concepts that emerged from the group for whom the conservation of biodiversity was not the main area of interest.

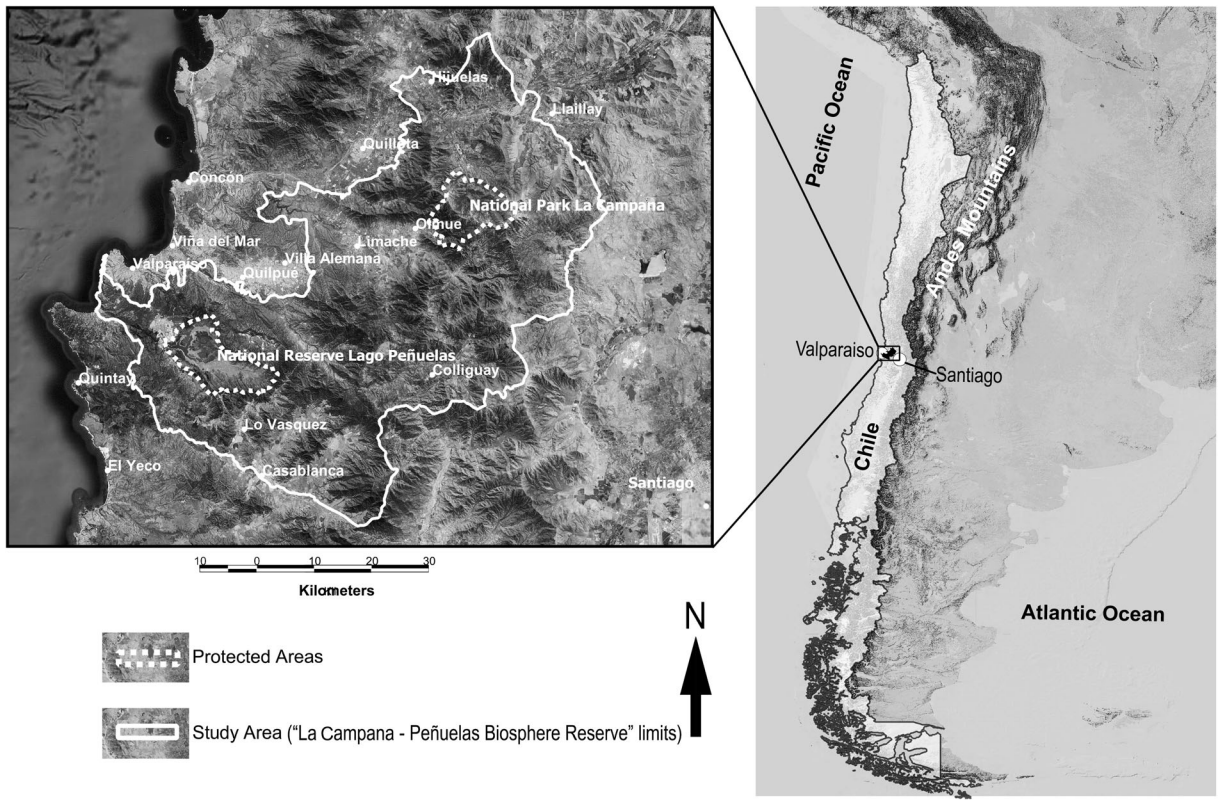

Fig. 1 Location of the study area, the Campana Peñuelas Biosphere Reserve

Before the interviews began, the project was approved by the Research Ethics Committee of the Faculty of Social Sciences of the University of Chile.

Analysis of data

Responses to the question of what participants understand biodiversity to mean were transcribed verbatim into an Excel database and guided the inductive identification of the different concepts that each group of actors used to define biodiversity (Cerda and Losada 2013). To increase sensitivity to the local sociocultural context, concepts were coded inductively rather than using categories identified by previous research to classify them (Riechers et al. 2016).

Results

Forty-five actors were able to spontaneously express concepts related to biodiversity; two small farmers expressed having no idea about the term. Twenty-two concepts to define biodiversity emerged from the respondents. Table 2 shows the concepts, the number of mentions for each group, and the number of concepts given by each group.

Table 2 indicates that the small farmers and enterprise owners had the highest diversity in their definitions of the concept of biodiversity. In contrast, the employees of the local government provided the lowest number of concepts. The concepts ranged from purely ecological[2] (e.g., diversity of animals and plants, ecological complexity, equilibrium, ecological health, ecological cycles) to the inclusion of a human dimension (e.g., quality of life, tourism, and recreation). Ecological concepts emerged from all the groups of actors. In this sense, all the groups of respondents thought that biodiversity has something to do with the diversity of animals and plants. Tourism workers and enterprise owners mentioned ecological complexity, small farmers mentioned ecological

[2] We understand ecological concepts as those related to scientific knowledge but not linked to human experiences. Those concepts may refer to ecosystem components (e.g., diversity of animals and plants) or processes (e.g., ecological cycles, ecological health, ecological complexity, equilibrium).

Table 1 Key actors of the CPBR for whom the conservation of biodiversity is not the main focus of interest

Group	Description	Total
Small farmers	A group including local herders, farmers, and beekeepers. These people have a strong rural sense of place, have a low to medium level of education, and are closely linked to the study area. Local herders and farmers represent a group to which environmental degradation practices are attributed (Catalán 2015).	12
Representatives of local organizations	Actors who participate actively in small organizations such as neighborhood groups, boards, foundations, or an indigenous community. Those organizations do not focus on the conservation of biodiversity.	8
Employees of the local government	A group of highly educated people who work for the local administration. They do not have an environmental focus in their management and are closely linked to the study area.	7
Educators in schools and colleges	Teachers with a high level of education and a mainly rural sense of place. Their work is not strictly related to environmental education or research, but they live in the study area.	6
People working in tourism	Managers of small- and medium-sized local companies focused on tourism. Some are ecotourism companies, but they are not strictly related to environmental management or the conservation of biodiversity.	6
Enterprise owners	A heterogeneous group including the managers of medium-sized local companies with a high level of education. These companies focus mainly on agronomics, farming, and real estate.	8
Total	–	47

equilibrium, enterprise owners mentioned ecological health, and employees of the local government and educators mentioned cycles and continuity. Generic visions of biodiversity also emerged; for example, the concept of biodiversity as a life reservoir emerged from all the groups of actors. In addition, all the groups of actors used the term "nature" to address the concept of biodiversity. All the groups except tourism workers mentioned biodiversity as something to preserve or protect, and representatives of local organizations, educators, and enterprise owners described it as something about which people must be educated. Small farmers, representatives of local organizations, and employees of enterprises, besides giving ecological concepts, also gave an anthropocentric view of biodiversity, visualizing a connection between biodiversity and humans' quality of life. The idea of biodiversity as a special environment or space also emerged from the results, specifically from representatives of local organizations, educators, and tourism workers. Small farmers and educators also related biodiversity to the future and heritage. Small farmers and enterprise owners also conceptualized biodiversity as being related to the climate of the place. Small farmers were the only group from which the concept of landscape emerged. Other concepts or ideas that emerged, but with lower frequency, were that biodiversity is related to water; to something complex, broad, and holistic; to something unique; to sustainability; to science and research; to tourism and recreation; and to quietness.

Discussion

We obtained concepts that local actors living in a biodiversity hotspot, particularly in a BR, used to define biodiversity. We found that the term biodiversity encompasses a spectrum of concepts from purely ecological to more anthropocentric. The concepts of biodiversity that emerged from the respondents' appeal to generic points of view (e.g., diversity of animals and plants without specifying particular species, life reservoir, nature) relate to biodiversity generally, while others relate to more particular elements. Most of the respondents held holistic views when expressing concepts related to biodiversity. Among the different groups of actors, the most mentioned concept was variety of animals and plants, which emerged from all the groups. This shows that most of the respondents were partially familiar with the concept of biodiversity and approached it at the species level. This view is generic, not limited to any specific species. The finding that people mostly relate biodiversity to a variety of animals and plants has also been obtained by other studies conducted in Europe (e.g., Lindemann-Matthies and Bose 2008). At a local level, this result agrees with other preliminary studies in Chile (e.g., Asociación Kauyeken 2013) that found that

Table 2 Number of mentions for each group and number of concepts given by each group

Emerging concepts from local actors to define biodiversity	Small farmers	Representatives of local organizations	Employees of the local government	Educators in schools and colleges	Tourism workers	Enterprise owners	Total
Diversity of animals and plants	3	5	2	4	1	3	18
Ecological complexity, ecological relations					1	1	2
Equilibrium	1					2	3
Ecological health						1	1
Ecological circles, continuity			1	1			2
							26
Life reservoir	3	2	1	4	2	7	19
Something to conserve, preserve, protect, or care for	4	1	2	2		3	12
Nature	3	1	1	1	1	2	9
Quality of life	1	2				1	4
Something related to a special environment, to national parks		1		1	1		3
Something about which people must be educated		1		1		1	3
The future	1			1			2
Something related to climate	1					1	2
Heritage	1			1			2
Landscape	2						2
Water		1					1
Something complex, broad, holistic						1	1
Something unique						1	1
Something related to tourism and recreation	1						1
Something related to sustainability	1						1
Something related to science and research					1		1
Quietness	1						1
No idea	2						2
Number of concepts	13	8	5	9	6	12	
Number of mentions	23	14	7	16	7	24	

the concept of biodiversity is understood by Chileans primarily at the species level. In addition, concepts such as ecological complexity, ecological equilibrium, ecological health, cycles, and continuity also emerged from our respondents, although those concepts were mentioned less frequently than the diversity of species. As with the findings of Bakhtiari et al. (2014), these respondents' definitions of biodiversity reveal that people may also understand biodiversity as a regulator of ecosystem processes. Similar results were reported by Fischer and Young (2007) in Europe.

Most respondents also thought in a holistic way that biodiversity is something to conserve, preserve, protect, or care for, which might indicate their sense of a moral obligation regarding biodiversity (Cerda et al. 2013a). A less frequent concept that emerged is that biodiversity is something unique, which goes with something to conserve. It is interesting that this sense of responsibility for protecting biodiversity was also mentioned by small farmers and employees of enterprises. The fact that farmers, a group to which environmental degradation practices are attributed (Catalán 2015), explicitly

expressed the necessity to protect biodiversity deserves the attention of future research and may have important policy implications for the BR management. The fact that farmers and employees of enterprises, groups that are often seen as being in conflict with the conservation of biodiversity, expressed a need to conserve biodiversity may open a window of discussion for a constructive dialog in which the views of these actors on territory management and conservation goals are taken into account. In line with this finding, Cerda et al. (2014) found in a study on the Cape Horn Biosphere Reserve at the extreme south of the Americas that the local residents of the BR whose activities were often in conflict with the conservation of biodiversity also expressed the idea that humans must preserve the natural world, based on a sense of moral obligation. The driving force behind this reasoning should be further investigated in future research, which will contribute to the better communication of biodiversity conservation strategies to local stakeholders.

The concept of biodiversity as something about which people must be educated emerged from representatives of local organizations, educators, and enterprise owners, which may suggest a demand for more environmental education efforts and the view that education plays an important role in conservation. The reasoning that biodiversity is nature, a life reservoir, and something complex also expressed a holistic view of the participants. Future research may explore which elements of the biophysical world are included in these images (Barkmann et al. 2005; Berghoefer et al. 2010) and whether emotional aspects or material interactions are a greater part of the discourse of people who talk about biodiversity (Berghoefer et al. 2010).

The concept of biodiversity being related to a special environment and to national parks emerged from actors representing local organizations, educators, and tourism workers. These results seem to be in line with the findings of Bakhtiari et al. (2014) in the sense that people perceive an ideal condition for biodiversity, such as national parks, in which human intervention is low.

From small farmers and educators also emerged notions of the future (both small farmers and educators), heritage (both small farmers and educators), landscape (small farmers), tourism and recreation (small farmers), sustainability (small farmers), and quiet (small farmers). The concept of the future may be driven by a sense of the insurance value of the biodiversity that exists today (Bakhtiari et al. 2014; Cerda et al. 2014). Heritage may be related to the importance of biodiversity to future generations, which approximates the concept of sustainability. Those two concepts (future and heritage) are probably commonly used by educators in the schools as part of the education programs. Small farmers could be guiding their vision of biodiversity based on an option value that is linked to the importance or use that select species or biodiversity overall could have in the future (Cerda and Losada 2013), but it may also be that they have absorbed the political discourse of the BR around organic agriculture as a tool to link biodiversity conservation to agriculture. According to other studies (e.g., Bakhtiari et al. 2014), quiet is important for people who live near nature or who directly interact with nature in their daily lives, which is the case of small farmers. Small farmers, representatives of local organizations, and enterprise employees mentioned quality of life and something related to climate, which may suggest a link between biodiversity and the maintenance of living conditions for locals. Small farmers also mentioned water, which is seen as an increasingly limited resource in the area.

Farmers included recreational values when defining biodiversity, relating to the anthropocentric view of the concept. In addition, the concept of landscape emerged from the small farmers group. In this regard, future research should explore the meaning of landscape to people to assess whether landscape refers to cultural meanings and uses of land and can be seen as the human element of the environment (Schaich et al. 2010).

One of the main findings of this study is that the groups that explicitly use elements of human well-being to define biodiversity are small farmers, representatives of local organizations, and employees of enterprises. This result may indicate that communicating the concept of biodiversity and the importance of its conservation to these groups of actors will require more than the use of ethical arguments associated with the right of species to exist (Sagoff 2004); ecological arguments such as the diversity of animals and plants; or even elements such as the function of biodiversity at the levels of genes, species, and ecosystems (Noss 1990). The communication of biodiversity conservation to these groups should include utilitarian approaches such as the instrumental values of biodiversity, which can be transmitted through the concept of ecosystem services. For this purpose, strengthening the evidence based on the links between biodiversity and the provision of ecosystem services in order to make valid arguments to communicate the

instrumental value of biodiversity is extremely relevant for BR management. As a starting point of discussion to broadcast the importance of biodiversity conservation to these groups, the current framing of conservation as "people and nature" (Mace 2014) may be appropriate. This framing would require working with them in a collaboration that addresses the relationships between biodiversity and people's hopes and desires about the environment that they wish to live in and leave to their descendants.

In sum, our study and its results can contribute to visualizing the concepts through which different local actors of a BR relate to the concept of biodiversity. We provide a starting point for recognizing which concepts should be incorporated into the discourse on biodiversity conservation in the CPBR. This helps strengthen the current participation processes for implementing the BR model by opening up a diversity of perspectives that should be taken into account. At the local level, human communities will be better able to engage in a more sophisticated discussion about the importance of conserving biodiversity if more explicit examples of the social constructions of biodiversity are considered (e.g., Hull et al. 2001).

In addition, our results are relevant from the point of view of environmental education, which has been recognized as one of the main objectives of BRs. From the perspective of transmitting to the public the concept of biodiversity and the importance of protecting it, it is important first to clarify what understanding people have of biodiversity and then to design and apply educational strategies. These strategies not only should be related to correcting the understanding of which biodiversity means in scientific terms but also should incorporate philosophies and approaches that make sense to people. Public policies, both those directed to the conservation of biodiversity based on ecological values and those related to instrumental values (e.g., ecosystem services provided by biodiversity), are necessary for communicating the meaning of biodiversity and its conservation in the area. This finding is in line with those of other studies on social perceptions of nature (e.g., Hull et al. 2001), in which ecological concepts and anthropocentric concepts emerged.

It is relevant to note the limitations of our approach. The concepts given by individuals to define biodiversity may not contain all the components of their arguments. Holistic views used to define biodiversity may be a representation of this lack of completeness. Future research should explore in detail the perceptions of biodiversity management to shed light on the factors that determine public acceptance of concrete biodiversity management measures (Fischer and Young 2007). We also recognize that previous research (e.g., Christie et al. 2006) has suggested that respondents' insecurity with regard to technical terminology can constrain the elicitation of individual perceptions. Thus, visual methods can be used to elicit deeper responses (Fischer and Young 2007; Snaddon et al. 2008). In addition, the different factors that inform people's understanding of biodiversity should be explored in future research. Still, the information obtained in this study allows initiating a dialog with local stakeholders on how to better manage biodiversity. We think the concepts that emerged from some groups of actors in this study shed light on the necessity of combining arguments to make them work together more effectively.

Our results allow the visualization of some policy implications. The BR model explicitly recognizes the necessity of integrating different actors into the design and implementation of effective mechanisms of biodiversity conservation on the local, regional, national, and global scales and that local communities may be great allies in achieving conservation goals (O'Riordan and Stoll-Kleemann 2002; Stoll-Kleemann and O'Riordan 2017). This demand calls for direct science-society interaction between researchers and stakeholders such as policy makers as well as those being constrained in their activities by biodiversity conservation. From our point of view, concrete research efforts that make this integration explicit are still lacking. We think that education efforts on the importance of conserving biodiversity may fail if we do not first reason with the values or the social understanding that already exist. Prior knowledge and understanding of these values allows us to prevent the potential low effectiveness of imposed educational mechanisms that do not take into account the knowledge already rooted in people, and we see it as an opportunity to find more effective strategies of communication or education that will allow us to strengthen knowledge, to find appropriate approaches to communication, or to correct misinformation when necessary.

Conclusion

We found that the term biodiversity encompasses a spectrum of concepts from purely ecological to more

anthropocentric. Most respondents spontaneously expressed holistic views when defining biodiversity, with the most mentioned concept being a variety of animals and plants. This observation leads us to conclude that most of the respondents were partially familiar with the term biodiversity and approached the concept at the species level. In addition, actors living in a close relationship with nature provided a greater diversity of elements in defining biodiversity, visualizing ecological but also instrumental values. Different communication strategies for the conservation of biodiversity require different approaches and messages, depending on the actors who take part in the dialog. We have offered a first image of the social understanding of the concept of biodiversity in a BR located in a biodiversity hotspot in South America, which we hope will contribute to the design of effective communication strategies on the importance of conserving biodiversity in this internationally relevant area.

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Compliance with ethical standards

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

Ethical approval Ethical approval for studies with human participants was obtained for the research from the Scientific Ethics Committee of the Faculty of Social Sciences of University of Chile.

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