RESEARCH ARTICLE

PEOPLE AND NATURE | BRITISH ECOLOGICAL SOCIETY

'Societal Relationships with Nature': A framework for understanding nature-related conflicts and multiple values

Uta Berghöfer[1] | Julian Rode[1] | Kurt Jax[2,3] | Johannes Förster[1] | Augustin Berghöfer[1] | Heidi Wittmer[1]

[1]Department of Environmental Politics, Helmholtz-Center for Environmental Research—UFZ, Leipzig, Germany

[2]Department of Conservation Biology and Social-Ecological Systems, Helmholtz-Center for Environmental Research—UFZ, Leipzig, Germany

[3]Research Department Life Science Systems, Technical University of Munich, Freising, Germany

Correspondence
Kurt Jax
Email: kurt.jax@ufz.de

Handling Editor: Rachelle Gould

Abstract

1. In this paper, we operationalize the concept of Societal Relationships with Nature (SRN) as a framework for understanding nature-related conflicts and multiple values.

2. Based on three dimensions *knowledgescape*, *interactions* and *identity*, we propose a set of questions for the empirical analysis of conflict situations.

3. We use two case studies—designation of a biosphere reserve in southern Chile and the return of the wolf in Germany—to illustrate how the SRN framework can reveal and structure the complexity of human–nature relationships.

4. From the conceptual advances and the academic debate on multiple values of nature, we derive four requirements for approaches to analyse nature-related conflicts and how different stakeholders attribute importance to nature.

5. These should (a) cover the relevant aspects and reveal the critical issues underlying a conflict, (b) enable an understanding of differences and commonalities in people's perspectives and positions, (c) be comprehensive enough to uncover important issues in complex situations without losing empirical practicability and (d) take power relations into account.

6. We discuss whether and how the SRN framework meets these requirements.

7. We present the SRN framework in particular to the academic community working at the interface with policy and practice on multiple values of nature and nature-related conflicts.

8. SRN analysis can also be applied to complement valuation approaches by specifying and explaining differences in people's attributions of value to nature.

KEYWORDS
Societal Relationships with Nature, nature conservation, environmental conflicts, multiple values, human interactions with nature, identity and nature

1 | INTRODUCTION

Across the globe, environmental changes brought about through extractive resource use, new or more intensive land uses, and infrastructure development are affecting relations between humans and the natural world in fundamental ways. Many studies have been conducted in an effort to characterize environmental changes, understand conflicts, and to measure and quantify social and economic impacts.

In the last decades, these discourses have often been framed around the issue of which values different people (individually and as a society) attribute to nature, or to specific parts of nature. The ecosystem services concept has become a popular way of referring to this issue, even making its way into the policy arena (see Section 2 below). The notion of ecosystem services makes it possible to integrate the ecosystem-related consequences of environmental changes for human beings—previously dismissed as 'externalities'—into decision-making processes, such as those addressing the effects of deforestation on drinking water supply and quality. Partly following the critique of the ecosystem services concept and its application, which some perceive as too narrow or too focused on economic issues (e.g. Melathopoulos & Stoner, 2015; Norgaard, 2010; Raymond et al., 2013; Schröter et al., 2021), researchers have sought to extend the realm of valuation. This has involved a shift from a monistic language of valuation towards value pluralism (Arias-Arévalo et al., 2018; Kenter et al., 2015) based, for example, on the notions of 'relational values' (Chan et al., 2016; Himes & Muraca, 2018), 'nature's contribution to people' (NCP) (Díaz et al., 2015, 2018), and 'life-value frames' (O'Connor & Kenter, 2019). These conceptual advances also emphasize that the 'broader context' and people's 'worldviews' must be considered as well as the procedural issues within which a 'valuation exercise' is embedded, such as participation and the specifics of the elicitation process (Jacobs et al., 2016; Pascual et al., 2017). Recent contributions on the social values of sustainability (Raymond et al., 2019) highlight how context, power relations and complex relationships across time and space affect value formation and articulation. While there is a lot of literature dealing with these issues, it remains challenging to adequately consider them within practical valuation processes.

In this article, we show how the concept of Societal Relationships with Nature (SRN), originally developed in environmental sociology (Becker & Jahn, 2006; Görg, 2003, 2004), can address some of these challenges (Berghöfer et al., 2010). The SRN framework can be used to analyse human–nature relationships in specific settings or issues involving nature as well as in conflicts related to nature and in situations where such conflicts may arise. The analytical framework we propose here looks at three dimensions—*knowledgescape*, *interactions* and *identity*—to provide a comprehensive view of important factors underlying the different interests, opinions, attitudes and value attributions that stakeholders hold vis-a-vis the issue at stake. The analysis of these three dimensions, in turn, can illuminate what may be driving the conflicts between different groups, but can also reveal common ground. An analysis using the SRN framework can thereby help identify conflict resolution approaches and serve as a basis for better-informed political and societal decisions.

We would like to present the SRN framework in particular to the academic community, especially to scholars working with policy and practise on multiple values of nature or nature-related conflicts. We fully agree with the demands for more value pluralism and context dependence in valuation exercises and acknowledge that recent research on environmental values is addressing some of these critical issues. The debate may benefit from complementary approaches, such as the SRN framework, that do not place the notion of values in the centre of attention. An advantage of not using the notion of values explicitly is that many people have reservations against approaches based on values and valuation (especially of ecosystem services) as focusing too much on an economic perspective, and that practical valuation exercises tend to be conducted in a narrow economic sense (James, 2016; Muradian & Gómez-Baggethun, 2021; Neuteleers & Engelen, 2015; Raymond et al., 2013).

In this article, we show how the SRN framework can reveal and structure the complexity of human–nature relationships relevant to environmental decisions and conflicts by enabling a comprehensive view on entities, processes and relationships at the same time. This can help analysts to identify and incorporate important underlying factors that can explain nature-related conflict situations and the diverging value attributions by different stakeholders. Depending on the specific situation, these factors may include differences—as well as changes—in people's lifestyle, health, self-determination and influence, sense of place, knowledge, or economic opportunities related to nature, as well as their historical underpinnings. Thereby, an analysis along the SRN framework helps specify and explain both the differences in people's attributions of value to nature and how they affect people's relationships with each other (in conflict situations, for example).

Section 2 of the paper briefly describes the history and current state of concepts used to assess nature's value and the lessons one can learn from it regarding challenges for understanding human–nature relationships. This leads to the formulation of four requirements that seem particularly relevant for approaches to understand human–nature relationships and their significance for environmental change and conflicts. Section 3 then introduces the concept of SRN and its operationalization as an analytical framework. Two examples, from Chile and Germany, are used to illustrate how the framework can be applied and how the SRN analysis can highlight critical aspects of peoples' relationships with nature that are often only considered rather marginally as part of the broader context. In Section 4, we discuss how SRN fares according to the four requirements derived in Section 2, in particular how an analysis using the framework reveals key factors underlying nature-related conflicts and multiple values.

2 | CHALLENGES OF UNDERSTANDING HUMAN–NATURE RELATIONSHIPS: LESSONS FROM THE EVOLUTION OF VALUATION APPROACHES

Much of the current debate on environmental valuation is linked to the ecosystem services concept. This concept was developed

originally on the basis of both a conservation perspective—including the idea that nature has a functional value in addition to its economic, aesthetic and moral values (Ehrlich & Ehrlich, 1981, p. 6)—and a landscape planning perspective, which emphasizes the 'functions of nature' (De Groot, 1987). Early on in this process, economic arguments were also put forward (Costanza et al., 1997), demonstrating that nature has a complex economic value beyond its provision of tradable goods. With the Millennium Ecosystem Assessment (MA, 2005), the concept of ecosystem services entered the political arena as a tool for assessing the state and potential future of the earth's ecosystems. Since then, it has been used in various scientific and policy contexts. It can serve as a merely 'didactic' tool for demonstrating the benefits of nature—qualitatively or quantitatively—or as a practical tool applied in assessments and planning, and in addressing environmental conflicts (Berghöfer et al., 2016; TEEB, 2010). The ecosystem service category of 'cultural services' subsumes a variety of less tangible aspects of humans' relationships to nature, such as outdoor recreation, spiritual and inspirational qualities. Follow-up conceptualizations, notably relational values (Chan et al., 2016; Himes & Muraca, 2018), aim to better differentiate and characterize these aspects. Monetary valuation of ecosystem services tended to be prominent, although meanwhile new methodologies are taking values other than monetary ones into account, for example, health values and shared social values (e.g. Jacobs et al., 2016; Kenter et al., 2015; UK National Ecosystem Assessment, 2011). A broad range of ecosystem service valuation methods can be applied and tailored to the specific task, stakeholders and context (Chan & Satterfield, 2020; Harrison et al., 2018; Jacobs et al., 2018; Jax, Furman, et al., 2018).

In response to criticism of the ecosystem services concept as adopting an overly economic perspective on—and even commodification of—nature (e.g. Gómez-Baggethun & Ruiz-Pérez, 2011; Keulartz, 2013), efforts have been undertaken to broaden the conceptual scope for valuing nature. This involves moving away from a 'monistic' valuation of nature, which tries to make all values comparable by expressing them in a single 'currency' (usually money), towards a more pluralistic view of value (Arias-Arévalo et al., 2018; Chan et al., 2016; Díaz et al., 2018; Jacobs et al., 2020; Kenter et al., 2015) that does better justice to and incorporates intangible, cultural and incommensurable values (Chan et al., 2012; Gould et al., 2014).

There is still considerable disagreement in the academic community over whether all the values attributed to nature by humans can (or even should) be conceptualized in an ecosystem services framework (e.g. Jax, Furman, et al., 2018; Kirchhoff, 2012, 2019; Norgaard, 2010), and similar doubts have also been addressed in the policy arena, particularly within the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES). In the course of negotiating a common conceptual framework for IPBES (Borie & Hulme, 2015), some Latin American states in particular disagreed with the western notion of ecosystem services and related concepts, calling instead for the inclusion of a broader set of human relationships with nature by referring, for example, to

'gifts of nature' instead of 'ecosystem services' (UNEP, 2014[1]). To account for some of these values and relations (e.g. values that are not perceived as benefits but where the relationship as such matters), one of the concepts introduced was 'relational values' (Chan et al., 2016; Himes & Muraca, 2018; Muraca, 2011), which especially emphasises non-material and even other-regarding values (such as care: Jax, Calestani, et al., 2018). The 'preliminary guide regarding diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services' (Pascual et al., 2017; UNEP, 2016) opened up the space for a more comprehensive understanding and articulation of nature's importance to communities and societies along with opportunities to acknowledge and include nature's relational and intrinsic values. Following this, experts involved in IPBES suggested replacing the term ecosystem services and even 'nature's benefits to people' by the more inclusive one of 'nature's contributions to people' (NCPs), which they defined as '[a]ll the positive contributions or benefits, and occasionally negative contributions, losses or detriments, that people obtain from nature' (Díaz et al., 2018). It explicitly embraces concepts associated with other worldviews and knowledge systems linked to human–nature relations (e.g. 'nature's gifts' in many indigenous cultures) (Pascual et al., 2017, p. 15). There is, however, considerable disagreement over the extent to which NCPs add to the ecosystem services approach or improve practical conservation policies (Kadykalo et al., 2019; Kenter, 2018; Peterson et al., 2018). Other conceptualizations such as the 'Life Framework of Values' are now being proposed (O'Connor & Kenter, 2019), and are again subject to academic controversy (Neuteleers et al., 2020).

The debate on how to conceptualize the values of nature reveals a number of challenges regarding the understanding of human–nature relationships. Rawluk et al. (2019) analyse how the notion of values has different meanings across disciplines and theoretical traditions, in terms of their level of abstractness (locatable, tangible vs. abstract principles) and context dependency (stable and generalisable vs. situationally flexible). Kenter et al. (2019) discuss how the many dimensions and lenses of different concepts of value raise challenges for those seeking to navigate within a given valuation task. They also point to the significant role of power structures, social context and procedures for value articulation in shaping and activating value attributions. In this ongoing academic debate, there is broad discussion on how to practically integrate values and valuation methods into decision-making, policy interventions and efforts to tackle complex environmental problems on the journey towards sustainability (Christie et al., 2019; Horcea-Milcu et al., 2019; Kronenberg & Andersson, 2019; Raymond & Raymond, 2019).

The discussions with regard to the valuation perspective for understanding human–nature relationships have become increasingly reflexive and self-critical (also from some major proponents, e.g. Gould et al., 2020; Muradian & Gómez-Baggethun, 2021), strongly pointing at gaps and challenges associated with the different approaches described above (especially ecosystem services and NCPs). From our reading of the various challenges for valuation,

we identified the following requirements as particularly relevant for judging the suitability of approaches for empirically exploring human–nature relationships and their significance for environmental change and conflicts.

- Does the framework cover the relevant aspects that characterize a situation, and does it reveal the critical issues underlying a nature-related decision or conflict?
- Is it suitable for understanding differences and commonalities in people's perspectives and positions?
- Is it comprehensive enough to uncover important issues in complex situations without losing its empirical practicability?
- Is it capable of considering power relations?

We propose Societal Relationships with Nature (SRN) as a framework that can be helpful for understanding human–nature relationships and controversies in specific situations, and to identify common ground. It specifies who relates to whom and to what, and can inform us about *how* these relationships are configured. SRN as a sociological concept (Görg, 2003) and its empirical operationalization (Berghöfer et al., 2010) have been developed independently of the valuation debate (see below). The framework proposed in this paper hence does not elicit values directly, but it can inform us where value attributions come from. The discussion Section 4 describes in detail how we believe the SRN framework fares with respect to the above requirements. SRN may be used as a 'standalone' heuristics for analysing situations, or, in other cases, as complementing valuation approaches. We explicitly discuss this complementary role since we also see this paper as a contribution to the debate on multiple values.

3 | SOCIETAL RELATIONSHIPS WITH NATURE AS A FRAMEWORK FOR APPLIED ANALYSIS

3.1 | Origins

The concept of Societal Relationships with Nature (SRN) (Becker & Jahn, 2005, 2006; Görg, 2003, 2004, 2010; Hummel et al., 2017) has been developed in environmental sociology. Its key premises are as follows: (a) 'nature' is not something given but is rather a result of the relations that exist among individuals, society and the physical world; (b) the making of nature is a political and historical process and (c) multiple relationships exist simultaneously. The concept treats nature and society as differentiated social and natural realms that have no fixed boundaries and are comprised of elements that are selectively and dynamically linked (Becker & Jahn, 2005). Constructivist concepts have evoked some criticism in the past, in that constructivism appears to question the very existence of nature 'apart from humanity's perceptions and beliefs about it' (Soulé & Lease, 1995; see also Crist, 2004). However, understanding nature as socially constructed does not involve neglecting the material conditions of

a physical world; the physical world has its own dynamic that may disrupt or destabilize the construction process. We use the abstract term 'nature' as a placeholder for what has to be specified in each context—a landscape, a specific ecosystem, the natural environment, green spaces in a city or a certain assemblage of species. By analysing the terms used for 'nature' in 60 different languages, Coscieme et al. (2020) show that the meaning of 'nature' differs enormously between situations and cultures. Some cultures do not even use this abstract notion at all (see also Ducarme et al., 2020).

The SRN concept indicates that the 'nature–culture' or 'nature–society' dichotomy is only one possible interpretation of the human–environment nexus and may even constitute an obstacle to more detailed and differentiated perceptions of the diverse connections among organisms (human and non-human) and between organisms and their surroundings. We encourage readers to reflect on their own use of the term 'nature' and to scrutinize what exactly they mean by it. As we will demonstrate, the SRN framework presented here, through its complementary questions, aims to untangle what each societal group is referring to when they talk about 'nature' (if they do so at all) and which elements matter in a given situation. People perceive, relate to, inhabit, interact and give meaning to nature in many different ways, both within and across cultures (see Zent, 2015). The way people interact with and live in nature shapes their perception and appreciation of it, and this in turn finds expression in norms, habits and customs. This applies not only to individual perspectives or 'local or indigenous' communities; for instance, a national environmental law is also the expression of a certain way of interacting with and attributing importance to nature. Therefore, divergent worldviews, languages and cultures—with the specific meanings they attach to nature—can be at odds with each other (expressed, e.g., in diverging perceptions, behaviours, societal norms and policies). What Becker and Jahn (2006) refer to as 'practices of differentiation' amounts in practical terms to a process of clarifying the specific differences in how people relate to the natural world and how it shapes their worldview. This may include, for instance, characterizing what exactly is meant by an 'indigenous' relation to nature.

Such a differentiated view also brings relevant power relations to the surface. It can detect which and whose relationships are recognized as significantly different from each other (or significant at all) and which others are being neglected. Power relations play a role not only in decision-making processes, but also in the process of (often subtle) negotiations about meanings. Ideas are generally formulated, shared, negotiated and applied within a context of power struggles, that is, in a political context (Adams & Hutton, 2007; Escobar, 1998).

3.2 | Key dimensions of Societal Relationships with Nature

For the empirical application of the SRN concept, we adapt and further operationalize three dimensions[2] for analysing human–nature relationships developed by Berghöfer et al. (2010): knowledgescape,

Case study 1: The wolf in Germany

Context: The grey wolf *Canis lupus* was once a common part of German and central European fauna. Growing conflicts with agriculture and hunting eventually led to its complete extermination in the early 20th century. During the last few decades, grey wolves have gradually returned to Germany from eastern European regions. Since 2000, the wolf population is growing by an average of 28% per year, expanding mainly into north-western regions thanks to its legal protection as an endangered species (Reinhardt et al., 2021). This has led to heated public debate on how to deal with the wolf as a large predatory species in a densely settled country (Arbieu et al., 2019).

Method: We applied a literature-based approach to analysing the divergent views of stakeholder groups (hunters, shepherds, livestock farmers, crop farmers, nature conservationists and the public) in line with the SRN framework. First, we searched for scientific articles dealing with wolves in Germany based on keywords and snowballing. To achieve a balanced representation of different stakeholder groups, we added recent (2018/19) articles from newspapers (based on a database in Otterspeer, 2018), the Internet and position papers. Quotes from relevant passages were sorted by actor groups and synthesized in a table according to the three SRN dimensions and the institutional aspect (supplementary Table; data sources are listed at the end of our reference section). From this table, we derived critical differences as well as overlaps in the perceptions and positions of different stakeholder groups.

interactions and identity. These dimensions were originally derived by means of a grounded theory approach, in a study in southern Chile (see Box 2, below), to structure all the propositions put forward by the interviewees when asked about their relationship to nature in the context of the creation of the Cape Horn Biosphere Reserve.[3]

In the following, we explain each of the three dimensions and also point out the critical links between them. Table 1 presents an overview of the set of questions for empirical analysis based on the SRN framework. We emphasize that these dimensions are separated for analytical purposes but need to be considered as mutually interrelated. We use two empirical cases to illustrate different practical applications of the framework: the return of the wolf to Germany (see case study 1) and the declaration of a Biosphere Reserve in Navarino, southern Chile (see case study 2). In the first case, the SRN framework guided a systematic literature review; in the second case, it informed qualitative social research.

The guidance for the analysis via the SRN framework is meant as a heuristic that can be adapted to a specific context. As presented here, it is suitable mainly for application by researchers who aim to inform decision-making and conflict resolution in practical contexts,

rather than as a tool for practitioners. Upon asking the questions summarized in Table 1 researchers can pinpoint the basis of conflict by searching for differences among groups of people in knowledge about the natural environment, identity (how people define themselves in relation to nature) and interactions (use of and dependency on nature). Within these domains, researchers can then zoom in to diagnose more carefully how these differences are constituted. Adapting the framework also entails deciding in each specific setting, which questions will have to be answered and in what level of detail.

3.2.1 | Knowledgescape

Berghöfer et al. (2010) define the *knowledgescape* of a person or a group of people as the lenses through which people perceive and understand their natural environment. We use the term *knowledgescape* (composed by knowledge and scape) to emphasize our understanding of knowledge as constituted similar to a landscape: different elements and their links, functions and connections, which differ depending on the position and perspective of the beholder. It contains 'elements of knowledge', that is, *what* is known. Moreover, it includes 'knowledge transfer and background', which refers to how knowledge is ordered, how the process of knowledge acquisition takes place and where knowledge originates. Knowledge transfer can be described in spatial terms, from local to global channels, and typologically, from practical, experimental knowledge to mediated, cognitive knowledge. The notion thus recognizes not only that knowledge encompasses facts and information but also that it has a particular history and function (see also Stephenson, 2008 for a related approach in a valuation context[4]). This helps in overcoming typical conceptual dichotomies such as traditional versus modern, indigenous versus scientific and local versus global knowledge (Agrawal, 1995; Brosius, 2006; Görg, 2003; Pedynowski, 2003). To get most out of the SRN framework, it is advisable to refrain from pre-defined categories and to start with an open mind for approaching and understanding differences and similarities in knowledgescapes. Analysing the different knowledgescapes offers insights into how nature is conceptualized by different groups of people. It also involves assessing how these differences play out in institutions and corresponding power relations, pointing towards the level of discursive power of different groups (see lower part of left-hand column in Table 1).

An important aspect of knowledgescapes is the consideration of baselines or reference points. In every decision-making context, specific baselines are established, often representing current conditions, but sometimes historical conditions. The benchmarks may significantly differ between groups. For example, in the debate about the wolf returning to Germany (supplementary Table), hunters typically refer to the current situation ('hunters replace the function of missing predators and play an important role in wildlife regulation'; 'wolves do not fit into the German cultural landscape anymore'). Conservationists tend to refer to the past as a desirable state, which

TABLE 1 Overview of guiding questions for analysing SRN
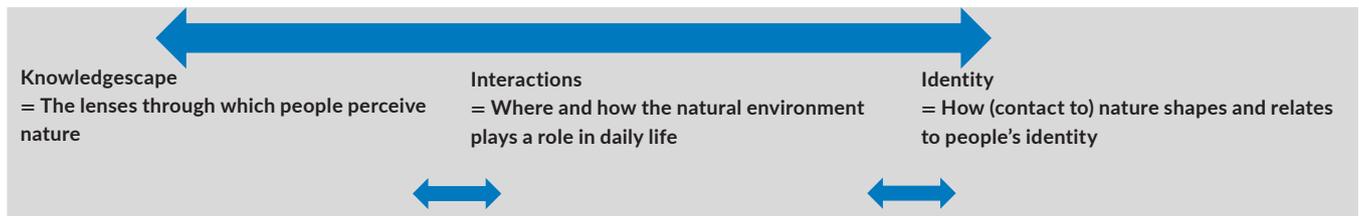
Knowledgescape = The lenses through which people perceive nature	Interactions = Where and how the natural environment plays a role in daily life	Identity = How (contact to) nature shapes and relates to people's identity
What are the critical differences among groups of people in with respect to the three dimensions?		
1. *What* is known: What do different groups of people think and know about the natural environment in question? Which issues are focused on? What is neglected? 2. *How* it is known: What are people's modes of knowledge acquisition, the sources of information where they draw knowledge from, and the (cultural) background which forms and embeds knowledge? 3. What are the critical lines of reference in terms of geographical scale, time scale, social scale?	1. What are people's interactions with nature in terms of direct material interactions, indirect material interactions, and non-material interactions? 2. Which interactions are perceived as 'normal' or taken for granted? 3. To what extent do people rely and depend on their interactions with the natural environment in question?	1. Where and how are different groups of people related to nature in terms of belonging, sense of place, and emotional attachment? 2. How do different groups of people express their identity and their own role in relation to nature?
How do these differences play out in institutions and corresponding power relations?		
What are the (formal/informal) institutions that regulate knowledge transfer?	What are the (formal/informal) institutions that regulate material interactions?	How is nature represented in culture and institutions?
Whose knowledge counts? Whose 'language' is used?	Whose interactions are favoured or hindered by these institutions?	Whose 'nature' dominates the public debates?

they hope to re-establish in the future ('the wolf is a natural element of European terrestrial ecosystems and returns to its ecological role'; 'the conservation status of the wolf is still unfavourable'). Particularly for long-term processes that involve slow changes, the choice of baseline may mask significant losses. Turner et al. (2008) state that the choice of current conditions as a reference point may 'represent a profound injustice', as many communities have witnessed generations of losses.

Furthermore, knowledgescape analysis needs to consider the distinction between concrete experience-based knowledge (e.g. having to deal with sheep that have been killed) versus abstract principles, concepts and systemic thinking (e.g. long-term nature conservation goals). For example, hunters and shepherds often argue from their personal and geographically specific (local) point of view whereas nature conservationists argue from a systems perspective, regarding it as a great success that a major predator has returned after a centuries-long absence. This matters to them even if no actual interaction occurs and the specific place or time are not of particular relevance.

Another aspect is language as part of the 'lenses' through which the surrounding world is structured (Coscieme et al., 2020; Ducarme et al., 2020; see also Pröpper & Haupts, 2014; Stephenson, 2008 for discussions within a valuation context). Human perceptions and understandings of nature, biological diversity and the natural world are embedded in language. The term 'nature' itself is an example of such a lens that implicitly draws lines and sets boundaries, which to some (indigenous) people does not even exist (Zent, 2015). By talking about nature in a certain way, people distinguish certain elements (e.g. natural ones) from

others (non-natural or less natural ones) that may be labelled culture, society, humans (or 'modern' humans) or technology. This, in turn, influences the ways people live in and with the natural world and how they seek to shape it (see below, 'interactions'). To make this point clearer, consider the example of the indigenous Amazonian Waorani word *ömö*, which defines forests as 'worlds inhabited by countless sentient beings who share with humans the same home, dispositions, values, and culture. The human-forest kinship implied in the word *ömö* stimulates the performance of rituals and is currently encouraging them, for example, to oppose oil extraction in the Amazonian forests' (Rozzi & Poole, 2011, p. 58). In contrast to this, as Rozzi and Poole argue, the English term *woodland* or, even more pointedly, *timberland* implies that forest ecosystems are on 'land containing the resource timber'. Wood or timber refer to an interpretation of trees as a resource, for either fuel or building materials. These contrasting definitions of forests illustrate how concepts embedded in language influence both the practices by which humans transform the environment and the ways in which humans perceive other species and their environment. The SRN framework leaves it up to the people involved to frame their concern in appropriate terms, which can help reduce misunderstandings.

In the Cape Horn Biosphere Reserve (Berghöfer et al., 2010), the *knowledgescape* of individuals from the same social group differed substantially between two generations. The founding of a school with mandatory attendance in Puerto Williams in the 1970s substantially changed the *knowledgescape* of the local residents, both Yaghan and other settlers. If a family lived and worked outside Puerto Williams, the child had to stay at the boarding school and

Case study 2: The Cape Horn Biosphere Reserve in Southern Chile

Context: The UNESCO Cape Horn Biosphere Reserve was established in 2005 in the Cape Horn region of southern Chile. It is one of the largest of such reserves in Latin America, comprising almost 5 million ha of land and seascape (Rozzi et al., 2006). The human population of around 2,300 inhabitants consists of (a) the indigenous Yaghan community, (b) permanent residents, some with European roots; (c) rotating Navy personnel with their families and (d) public service employees, often temporary residents who work for public authorities and of whom most live in the remote town of Puerto Williams on Navarino Island. The Biosphere Reserve concept promotes open and participatory processes that include local communities and non-governmental organizations in land use and conservation planning and management; it explicitly protects ecosystems maintained under long-established land use, in addition to wilderness areas (UNESCO, 2008). Berghöfer et al. (2010) conducted a socioecological study on the area to support the application of turning it into the Cape Horn Biosphere Reserve to better understand the varied relationships with nature that exist there and to provide information for the zoning and management tasks of the Biosphere Reserve.

Methods: A qualitative approach was used to analyse Societal Relationships with Nature in the biosphere reserve. The research methods included extended participant observation, qualitative semi-structured interviews and focus groups. Between August 2003 and August 2006, 68 interviews and four focus group discussions were conducted with the inhabitants of Puerto Williams, who belonged to different sociocultural groups. The analysis of different groups' different relationships with nature called into question the grouping of stakeholders according to conventional socioeconomic categories. For the Yaghan community in particular, it became clear that there was not a single and homogeneous 'local indigenous community' and that the boundaries or similarities with other local inhabitants shifted depending on the issues at stakes.

could only visit home during school holidays. For this reason, many nomadic families decided to settle in Puerto Williams in order to be near their children. Nomadic life required very different modes of learning about the natural surroundings: personal experience and exchange with other family members were their most important features. This regular interaction generated an intimate knowledge of species among the people concerned. Despite the influence of the national school system, personal experience with plant and animal species in the region remains the most important form of knowledge transfer, whereas standardized school curricula ignore regional landscapes and species.

3.2.2 | Interactions

The *interactions* dimension refers to the various activities in which people engage with nature. These interactions are, of course, related to people's understanding and appreciation of the natural environment. The middle column in Table 1 contains the questions that can guide our understanding of the differences in interactions between societal groups.

Interactions with nature can be characterised in terms of how direct they are as well as material and non-material. 'Material interactions' refer to activities that involve direct, material and often consumption-oriented contact with the natural environment, such as horticulture or agriculture, livestock farming, fishery, forestry, hunting, use for medicine and handicrafts. The analysis should not only focus on the economic aspects of these activities. It is also about *how* these activities take place: what is the culture of agriculture, the culture of dwelling, the culture of working, the culture of health care? People's material interactions with the physical environment can also take place over distances, and are associated in indirect ways with the globalized market, for example, buying Irish butter in the south of Chile. Such 'indirect interactions', and their impacts on nature as well as environmental conflicts elsewhere, often go unnoticed.

'Non-material or sensory interactions' include activities without—or with only a minor—material impact, such as observation, contemplation, religious activities, art and inspiration, leisure activities, walking, hiking, taking pictures, and many forms of scientific fieldwork. These interactions can also take place in conjunction with material interactions. Here again, it is important to look at *how* these activities take place. What is the culture of recreational activities, the culture of appreciation for nature? What is the relation between spirituality or religion and nature? For many cultures, modes of knowledge transfer are closely related to practices of observation, demonstration and participation (Maffi, 2001), which again highlights the link between the dimensions of knowledgescape and interaction.[5] In the same way, spiritual relations and interactions with nature also link to the third dimension of SRNs, that is, *identity* (see below). The extent to which people depend upon their natural environment is important for notions of equity and vulnerability: the more a group of people depends on their interaction with nature in a specific geographical place, the more likely their *knowledgescapes* and *identities* (see below) will also rely on it and the more difficult it will be to find an alternative to such interaction. In the worst case, restricted interaction can lead to a loss of knowledge, identity, culture and language—as demonstrated by the fate of many indigenous communities around the world (Rozzi, 2018).

Conflicts often arise when the interactions of some groups of people are—or at least seem to be—incompatible with those of

others. In the case of wolves in Germany, hunters regard wolves to not fit into the cultural landscape and find that their population is large enough for not being an endangered species. Nature conservationists regard the wolf population to be too small for ensuring their long-term genetic stability, and argue that they adapt to the cultural landscape. And yet, the SRN analysis also revealed points of agreement among hunters and nature conservationists, for instance that shepherds perform an important task in maintaining an open landscape of high cultural and conservation value while being negatively affected by wolf depredation (see supplementary Table). Once identified, such agreement and common ground among the actors can serve as a starting point for building trust and jointly develop strategies, in this case identifying protection measures for sheep and jointly taking action that allow shepherds to continue herding sheep despite the presence of wolves.

The issue of which interactions are 'allowed' is regulated by both formal and informal institutions, for example, property rights. Institutions often favour some interactions over others. In many cases, there are also competing institutions (e.g. traditional and formal ones), and new institutions are sometimes created for certain interactions, for example, policies on reducing emissions from deforestation and degradation (REDD+) for enhancing carbon capture through forests. The lower part of the SRN framework (middle column in Table 1) proposes guiding questions for looking at the role of institutions and power relations with regard to *interactions*: What are the (formal/informal) institutions that regulate material interactions? Which institutions dominate the interactions?

3.2.3 | Identity

The dimension of identity in the SRN framework refers to people's self-definition in relation to nature, that is, the extent to which a person or a social group incorporates (or excludes) aspects of the natural environment into their definition of self (Clayton & Opotow, 2003; Greider & Garkovich, 1994). Identity has become an important subject in the context of the recent debate on 'relational values' (Chan et al., 2016; De Vos et al., 2018; see also Fish et al., 2016). Beyond and before that, environmental, or place-related, identity factors have been studied by a range of disciplines, such as cultural geography, anthropology, environmental psychology, sociology and also environmental ethics (Clayton & Opotow, 2003; Devine-Wright & Clayton, 2010) that have made use of various terms, including 'relatedness' in the sense of emotional attachment (Greider & Garkovich, 1994; Ingold, 2000; Low & Lawrence-Zúñiga, 2003), 'sense of place' (Grenni et al., 2020; Kaltenborn, 1998; Williams & Stewart, 1998) or 'place attachment' (Manzo & Devine-Wright, 2013), and 'ecological identity' or 'environmental identity' (Clayton & Opotow, 2003). They describe different facets of the 'self' that are constituted through environmental attributes. The most evident place-related facet of a (collective) identity is a 'sense of home'. This is characterized not only by cultural attributes (language, routines, etc.), but also by environmental attributes such as scenery, climate, vegetation, bird life and so forth. Table 1 (right column) presents the guiding questions that can be asked to assess critical differences in peoples' identity related to nature.

This involves looking at identity factors related to belonging, sense of place and emotional attachment as well as at how the different groups of people express their relation to nature. For the latter, it is important to understand how groups perceive the relationship of humans in nature: as inseparable part of nature, as stewards of, as restraining and bringing nature under control; what is seen as antagonistic, what is seen as central to humans and how groups define their specific role in nature.

Identity is shaped by people's interactions with nature and their ways of thinking about it. In the case of the wolf in Germany, for instance, hunters often perceive themselves as people who—through their hunting activities—are entrusted with ensuring that an 'ecological balance' is maintained; they see themselves thus as custodians of forest ecosystems (see supplementary Table). The wolf competes with hunters not only for prey but also for this part of their identity as regulators of forest ecosystems. This may be an additional factor that contributes to the conflicts arising from the return of the wolf to Germany. Institutional setups can also challenge identity of actors, that is, European and German nature protection laws formally protecting the wolf. In doing so, the institutional context reflected the state of nature desired by conservationists and challenges the custodian part of the hunters' identity (see lower part of column 3 in Table 1: How is nature represented in culture and institutions? Whose 'nature' dominates the public debates?). A change in the formal legal situation (e.g. granting permits for hunting wolves) can influence the roles and self-perception of different groups.

Identity is also rooted in (individual and collective) memories, has historical links and is shaped by individual and societal narratives (Klain et al., 2014; Ricoeur, 1992). A person's identity in relation to nature involves the construction of mental and emotional boundaries: to whom and what do I feel connected and whom or what do I exclude? Identity issues become relevant if these boundaries are contested. Consider the largely critical attitudes of German farmers towards the idea of peatland rewetting for the purpose of climate change mitigation: For centuries, farmers have seen themselves as 'mastering' peatlands by draining them for agricultural use, a self-conception as 'restraining and converting nature'. This collective memory has largely lost its legitimacy, as peatland rewetting has become a prominent strategy for reducing greenhouse gas emissions. Yet, historical memories and experiences still shape peoples' local identity because of the enormous 'civilizing efforts' associated with past peatland drainage.

In processes of negotiating the value, meaning or importance of a certain species or landscape (feature) identity issues typically play a role (Klain et al., 2014; Stephenson, 2008). Examining these identity issues is therefore useful for understanding value attributions. However, this is no easy task. Examining identity—which comprises largely implicit patterns of behaviour and thinking (e.g. Clayton & Opotow, 2003; Devine-Wright & Clayton, 2010)—requires that an often unquestioned 'normality' itself become the focus of analysis. There has been a long history of problematic conceptualizations in this arena (O'Gorman, 2014).

Environmental identity issues (such as 'belonging') are not a simple question of ecology or culture but rather a matter of 'contested biocultural meanings' (O'Gorman, 2014, p. 285). This becomes obvious in reductive categories such as 'native', 'indigenous' or 'traditional', where boundary making based on simplified ideas can be problematic. Instead, specific analyses and their resulting differentiations may be able to reveal which environmental attributes count in identities.[6]

3.2.4 | Whose nature counts?—How different relationships with nature influence societal decision-making

We use the example of the Cape Horn region to illustrate how the SRN analysis can uncover different relationships with several 'natures' coexisting in a region, which may underlie nature-related conflicts. The example shows that there is no single 'local relationship with nature' that reflects a 'local world view' or 'cosmology' (Berghöfer et al., 2010). Furthermore, the political influence of these different relationships within the wider societal discourse can vary considerably. In the public debates held about establishing the biosphere reserve, two opposing knowledgescapes represented 'nature'. The dominant discourse, which was labelled 'nature that provides', focused on the extractive, in some cases industrialized use of specific marine resources (such as King crab, *Lithodes santolla*) as the main development option for the region. This was challenged by the voices representing 'global and endangered nature', which focused on nature as a complex ecosystem which includes humans and is perceived as passive but also as fragile and endangered and in need of strong conservation measures. From this perspective, the region was perceived as 'one of the last wilderness and pristine areas' that had to be preserved. A focus on international high-quality (eco-)tourism was suggested as a development option that would allow for economic growth while still conserving pristine areas. A third type of nature, represented in local political debates but not referred to in regional or national debates, might be labelled 'the beloved land'. Here, the focus is on cultivating the land as a means to secure national sovereignty. In this case, knowledgescape and identity were closely linked to local material interactions. In the context of the impending war with Argentina in the 1980s, the Chilean Navy had been controlling access to the region until the end of the Pinochet era. Cultivating formerly 'non-used' land meant building a solid Chilean nation, thereby defending the region against possible Argentinian influence. Local inhabitants adhering to this view strongly emphasized their identity as settlers, referring to their interactions of 'hacer soberanía', that is, defending Chilean national sovereignty against Argentina. The more recent modes of farmers' interactions with nature still generally serve the goal of subsistence and of 'being a settler'. Any surplus is exchanged among neighbours or sold to the local supermarket.

While those who represented the 'global and endangered nature' perspective often referred to the local indigenous people's relationships with nature, the members of the indigenous community did not constitute a single 'indigenous relationship with nature'. Some

of the inhabitants who are officially called 'members of the Yaghan Community' had an 'on-site and direct relationship with nature', the natural environment being the space in which they live their everyday lives, and there are strong dependencies on local resources, with daily, locally embedded material and immaterial interactions with nature, be these marine or land-based activities. Other inhabitants of the Yaghan Community, however—especially of the younger generation—no longer depended on local material interactions with nature, and in some cases their land-based interactions resembled those of the European settlers.

Yaghan culture, community and identity have thus been eroded over time: with the arrival of European settlers, their interactions were increasingly limited, language and culture were forbidden under Pinochet dictatorship, traditional knowledgescapes based on direct interactions are questioned by formalized knowledge through compulsory schooling. Resulting struggles within the community on the question of who represents the needs and concerns of the Yaghan Community lead to a weak position in local and regional decision-making processes.

The Navarino Case illustrates how the SRN dimensions relate to and co-produce each other. Losses in one dimension (e.g. a reduction in interactions) may have severe consequences for the other dimensions (e.g. changing identity). It is therefore important to conduct the enquiry and interpretation of findings with an openness for such possible connectedness across SRN dimensions. Rather than presenting aggregated results, the SRN framework helps to unravel complex dependences and how these are connected to power relations and inequalities. The strength of the framework thus lies in creating a differentiated understanding of problems and conflicts arising from competing expectations towards different natures. The power imbalances involved cannot be overcome by the often demanded 'stakeholder inclusion' and self-reflective scientists and practitioners alone. In fact, even the most inclusive scientific approach will be unable to overcome the power imbalances embedded in the current institutions. These institutions determine, for example, which interactions are allowed or forbidden, what knowledge is considered valid, which elements of nature are to be valued. All of these factors predefine what a respondent can legitimately answer to a question concerning value attribution to nature. Explicitly looking at how different groups interact with different elements of nature, how they draw on different types of knowledge and how interacting with nature matters to their identity (first part of Table 1) allows researchers to understand the usually multifaceted differences from which conflicts arise. The questions in the lower part of Table 1 help to obtain a better understanding of power structures regarding relationships with nature and how they influence societal decision-making. This understanding is needed to identify entry points for negotiating solutions.

We would like to reiterate that the framework is intended as heuristic that can—and sometimes has to be—adapted to specific contexts. This does not mean that an entire dimension can be left out, but rather to screen all points to then decide where to go in-depth. Responses indicate what matters most to people and/or explains

their specific situation. Also, as shown in our two case studies, different methods (e.g. interviews vs. literature analysis, or a combination of both) may be used for applying the framework.

4 | DISCUSSION: THE SRN FRAMEWORK AND ITS SUITABILITY FOR SUPPORTING NATURE-RELATED DECISIONS

Scientific inquiry as well as practice-oriented efforts to support nature-related decisions and conflict resolution require analytical tools that can deal adequately with people's multiple worldviews, interactions and cultural meanings of nature. In Section 2, we derived four requirements for assessing the suitability of concepts and tools that aim to explore human–nature relationships and their significance for environmental change and conflicts. We discuss here how we think the SRN framework fares with respect to these requirements. We also highlight how the framework can complement valuation and give insights into how multiple value attributions come about.

4.1 | Does the SRN framework uncover the critical issues underlying a nature-related decision or conflict situation?

The three dimensions of knowledgescape, interaction and identity provide the basis for considering a broad range of relevant issues to capture and structure the complexity of human–nature relationships. Within these dimensions, the SRN framework approaches the situation from an open standpoint without predetermined categories. We are aware that no absolute 'objectivity' or a completely unbiased approach is possible, yet the SRN framework encourages to put aside pre-conceived perspectives and dominant metaphors of nature to allow for under-represented and unconventional views to be expressed. The broad sets of questions within the three dimensions invite the use of narratives, stories and visual elements to identify important factors. This can reveal a diversity of perspectives, different worldviews, and multiple values and should allow to uncover critical issues and differences that underlie conflict situations. Valuation approaches usually offer respondents a relatively strong predetermined framing (e.g. within contingent valuation scenarios), even though there is increasing awareness of the perspective that are implicit in specific valuation efforts (Jacobs et al., 2020). While this serves to elicit interpretable and comparable data, for example, as input for cost–benefit analysis, it may limit the breadth of issues and discrepancies that can be identified (Raymond et al., 2019).

A second aspect is that the SRN analysis can make aspects of space and time explicit, including historical developments. Identities, patterns of interactions and knowledge may all have formed over a long time (such as hunters regarding the wolf as their enemy). The SRN framework acknowledges the role of historical conflicts, injustices and losses, and invites researchers to look into the historical roots of current situations (see above). First, an open framing of questions allows respondents to

mention what matters to them and where they perceive the issues to arise from. Second, by tracing which positions are favoured or hindered by current institutions helps to understand where injustices might be perpetuated. Uncovering them ideally contributes to addressing or at least acknowledging them. While valuation approaches often include predictions about values that would accrue in the future, few look at value attributions in the past and how the current ones came about (for a notable effort in this direction, see Stephenson, 2008). The past evolution and underlying reasons may however matter when it comes to conflict resolution. For instance, the reasons why hunters attribute a low value to the presence of wolves can lie primarily in a historically evolved relationship rather than in current economic losses linked to a lower wild game population. While economic losses can be offset by monetary measures, identity-related animosity cannot usually be overcome by monetary compensation. Acknowledging identity, for example, in the justification for compensation payments, might increase their effectiveness in resolving the conflict.

As an important element of 'critical issues', SRN analysis helps in identifying which uses of nature and natural resources are socially and culturally compatible or incompatible with one another. Certain sets of interactions with nature are clearly incompatible with one another: flooding an area by building a dam for irrigation or electricity generation disrupts most if not all the previous interactions with nature in the area. Regulatory decisions can affect interactions with nature by introducing new rules or interfering with how current interactions are carried out. Prohibiting all human material interactions with nature in protected areas has widely been considered the best option to conserve 'nature'. Many examples, including experiences from UNESCO Biosphere Reserves show, however, that through careful management a considerable number of material interactions are compatible with conservation goals. Even more, certain states of nature require specific ongoing interaction with humans. This holds, for example, for many cultural landscapes (in Europe and elsewhere; see von Droste et al., 1995) as well as for apparently 'wild' areas, which in fact have been managed by indigenous people for centuries, if not millennia (e.g. with controlled fires, as in Australia or the Americas). A detailed understanding of how different groups interact with nature and what matters to them is an excellent basis for establishing adequate safeguards and policy interventions, such as sustainable quotas, permissions or restrictions at certain times or in certain areas. Thus, SNR analysis is a good foundation for identifying rules that make different interactions compatible with each other by respecting the most important features of other users and uses. This characteristic underlines the potential of SRN to reveal which use regulations could be ecologically effective *and* socioculturally feasible to resolve, mitigate or avoid conflicts.

4.2 | Is the SRN framework suitable for understanding differences and commonalities in people's perspectives and positions?

Directly following the discussion in Section 4.1, it is a central ambition of the SRN analysis to reveal discrepancies across groups of

stakeholders. Notably, the SRN framework allows for a grouping of actors that is relevant to the issue at stake, which can transcend typical dichotomies such as local/traditional knowledge versus scientific knowledge, use versus conservation or modern versus traditional worldviews. By specifying various facets included in the three dimensions knowledgescape, interactions and identity, the SRN framework can uncover implicit perspectives, worldviews, and positions that underlie people's thinking and acting, including unconventional and minority views. In doing so, it can contribute towards the development of a thorough understanding of differences and similarities between (groups of) actors.

In the Chilean example, the analysis showed that, among the settlers, it mattered whether they were from an Andean region or whether they were European immigrants, for instance with respect to their historical worldviews on how to cultivate the land. It also became clear that some immigrants (though not all) drew parallels between their own immigrant background and the (exotic) beaver[7] as an 'immigrant species', which led to a different attitude towards beaver protection versus eradication (see also Schüttler et al., 2011).

For discussions about which actions or policies are compatible—or incompatible—with people's priorities, it is helpful to search for differences in SRN between *and* within groups, rather than following predetermined stakeholder categories. Specifying and pinpointing these differences and (possible) common ground helps to untangle and overcome deadlocked polarities. This also makes it much easier to highlight the danger of 'invisible losses' (e.g. loss of self-determination or influence, loss of order in the world, knowledge losses and cultural losses, Turner et al., 2008) in environmental decision-making.

While valuation approaches can reveal discrepancies between actors' value attributions, they usually do not *explain* how these discrepancies come about. A complementary SRN analysis may thus also help to describe important factors underlying the values as well as (potential) conflicts, such as diverging worldviews, identities, beliefs or paradigms. These factors are frequently mentioned in the debate on multiple values (Pascual et al., 2017; Raymond et al., 2019), yet difficult to incorporate in valuation applications. In that sense, an SRN analysis can help reassess and restructure valuation results according to more specific actor groups and provide insights for a thorough interpretation of valuation results.

4.3 | Is the SRN framework comprehensive enough to uncover important issues in complex situations without losing its empirical practicability?

The dimensions of knowledgescape, interactions and identity serve as a prompt for identifying the important elements of the complexity of the system, in an interactive process of empirical research based on dialogue and exchange.

Having a range of guiding questions allows some flexibility and different entry points and avenues for enquiry. Not all questions need to be analysed in depth in each situation, they rather help to screen the situation and to reveal which aspects are underlying conflicts and where further detail is warranted. With respect to its applicability in practice, we acknowledge that the questions in Table 1 offer only broad guidance. Adequate application in practice certainly requires some experience and skills to select and adapt the analysis to a specific context. Rather than a tool that can directly be applied by practitioners, the SRN framework may therefore be more suitable for academics who can potentially support practitioners with their applied research on environmental conflicts.

As we demonstrate with the examples of Cape Horn in Chile and the return of the wolf in Germany, the SRN framework can be applied to assess relationships with nature at different levels of complexity and by relying on different empirical assessment methods. Ideally, the empirical data used would reflect as closely as possible the self-reported expressions and views of the people interviewed, for instance by conducting qualitative interviews or focus groups based on the guiding questions (Table 1) and analysing them, as, for example, in the Chilean case. Alternatively, one could search the available literature (scientific articles, newspaper articles, etc.) and other materials for statements that allow the analyst to uncover the dimensions, as we did in the wolf example (see supplementary Table).

Further efforts, such as guidance material or case study applications, may serve to better enable practitioners to apply the framework, especially in view of limited resources and research capacity.

4.4 | Is the SRN framework capable of considering power relations?

Societal power structures inherently shape human–nature relationships. Power relations are relevant not only in decision-making situations, but also and especially in how public debate is shaped by discursive framing (whose knowledge counts? whose language is used?). Questions regarding institutions and power relations are therefore included as an integral element in all three SRN dimensions. The guiding questions help to reveal which institutions (formal and informal) dominate the knowledgescape of different actors, regulate their interactions with nature and reflect or question identities. While making this explicit does not per se counterbalance existing inequalities, it can make everyone involved aware of power imbalances. Recent contributions in the multiple values debate have highlighted the importance of power relations and propose a deliberative form of valuation and communication with the public and decision-makers (Jacobs et al., 2020; Pascual et al., 2017). Nonetheless, analyses based on participatory approaches also entail difficulties with regard to incorporating a focus on power relations (Cooke & Kothari, 2001; Raymond et al., 2019). They struggle with power inequalities between participating stakeholders and with the influence of power in discursive framing. Moreover, even if power inequalities could be balanced out in the context of conducting the empirical analysis, they likely persist in the decision-making contexts. We consider it a strength of the SRN framework that it explicitly addresses and helps to uncover the power implications within all three dimensions analysed.

5 | CONCLUSION

Nature-related decision-making and conflicts are multi-faceted. The SRN framework presents a heuristic to capture this multiplicity and to shed light on underlying causes of differences or conflicts around environmental values, decisions on, and uses of nature. At the same time, the framework helps to identify solutions, as its broad framing—considering how people know about nature, how they interact with nature and how nature influences their identity—allows the actors involved to voice what matters to them. As in any approach, the opportunity to voice concerns is limited or at least conditioned by the current institutional setup and the underlying power relations, which strongly influence and thereby favour certain interactions. By explicitly looking at how power inequalities manifest themselves in rules and institutions, and by inviting a historical perspective, SRN also analyses the context and mechanisms forming human–nature relationships. Therefore, it can help identify those issues which conflicting parties should specifically focus on to find solutions. Such an understanding also facilitates identifying the most promising policy responses and/or the need for more fundamental changes in the institutional setting.

CONFLICT OF INTEREST

We declare that we have no known conflict of interest.

DATA AVAILABILITY STATEMENT

The data for the case study on the wolf in Germany are provided in the supplementary material and the sources at the end of the references section. No new data were assessed for the Navarino case study. The original data were already published in Berghöfer et al. (2010) (see References).

AUTHORS' CONTRIBUTIONS

All authors jointly developed the main ideas for the paper and contributed to the writing process; U.B. jointly with A.B., H.W. and K.J. provided the SRN framework, and U.B. contributed the case study on Navarino island (southern Chile); K.J. and J.R. led the writing and editing process of the manuscript; J.F. lead the analysis of the case study on the wolf in Germany.

ORCID

Julian Rode https://orcid.org/0000-0002-8210-5038
Kurt Jax https://orcid.org/0000-0002-1052-0195
Johannes Förster https://orcid.org/0000-0003-0174-926X
Heidi Wittmer https://orcid.org/0000-0001-6966-7258

ENDNOTES

[1] This relates, for example, to the Andean worldview of 'Pacha mama' (Mother Earth), brought into the IPBES process by Bolivia and Ecuador, which led to setting terms relating to different worldviews side by side in the IPBES conceptual framework (indicated by different colours in UNEP, 2014, Figure 1) without negating their differences; see also Borie and Hulme (2015).

[2] Please note that in the earlier paper (Berghöfer et al., 2010), we referred to these 'dimensions' as 'categories'.

[3] The general research questions of the study were as follows: How do people perceive, value and live with nature and biodiversity in the Cape Horn region? Can people's relationships with nature be specified according to particular categories, and, if so, which ones? See Berghöfer et al. (2010).

[4] The approach developed by Stephenson is in fact the one that comes closest to our framework, in emphasizing also the historical dimensions of what she calls 'forms', 'practices' and 'relationships' for explaining people's values of nature (here: specifically landscapes) and also in pointing at the simultaneous importance of interactions and identities.

[5] A related point, concerning the relations between knowledge and practice has been emphasised in some studies on valuation: Chan et al., 2012; Pröpper & Haupts, 2014; Stephenson, 2008).

[6] See, for example, various contributions to this issue in the book edited by Clayton and Opotow (2003) and also in a special issue on the subject ('Identity, place, and environmental behaviour') in the Journal of Environmental Psychology (Vol. 30 (3), 2010).

[7] The beaver (*Castor canadensis*, native to North America) was released on Tierra del Fuego in 1946 for fur production and later (in the early1960s) arrived at Navarino island by swimming across the Beagle Channel.

REFERENCES

Adams, W. M., & Hutton, J. (2007). People, parks and poverty: Political ecology and biodiversity conservation. *Conservation and Society*, *5*(2), 147–183 http://www.jstor.org/stable/26392879

Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. *Development and Change, 26*(3), 413–439. https://doi.org/10.1111/j.1467-7660.1995.tb00560.x

Arbieu, U., Mehring, M., Bunnefeld, N., Kaczensky, P., Reinhardt, I., Ansorge, H., Böhning-Gaese, K., Glikman, J. A., Kluth, G., Nowak, C., & Müller, T. (2019). Attitudes towards returning wolves (*Canis lupus*) in Germany: Exposure, information sources and trust matter. *Biological Conservation*, *234*, 202–210. https://doi.org/10.1016/j.biocon.2019.03.027

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*(1), 29–53. https://doi.org/10.3197/096327118X15144698637513

Becker, E., & Jahn, T. (2005). Societal relations to nature. Outline of a critical theory in the ecological crisis. In F. Böhme & A. Manzei (Eds.), *Kritische Theorie der Technik und der Natur* (pp. 91–112). Wilhelm Fink.

Becker, E., & Jahn, T. (2006). *Soziale Ökologie: Grundzüge einer Wissenschaft von den gesellschaftlichen Naturverhältnissen*. Campus Verlag.

Berghöfer, A., Brown, C., Bruner, A., Emerton, L., Esen, E., Geneletti, D., Kosmus, M., Kumar, R., Lehmann, M., Morales, F. L., Nkonya, E., Pistorius, T., Rode, J., Slootweg, R., Tröger, U., Wittmer, H., Wunder, S., & van Zyl, H. (2016). *Increasing the policy impact of ecosystem service assessments and valuations—Insights from practice*. Helmholtz Zentrum für Umweltforschung. Retrieved from. www.aboutvalues.net

Berghöfer, U., Rozzi, R., & Jax, K. (2010). Many eyes on nature: Diverse perspectives in the Cape Horn Biosphere Reserve and their relevance for conservation. *Ecology and Society*, 15(1), 18. Retrieved from. http://www.ecologyandsociety.org/vol15/iss1/art18/

Borie, M., & Hulme, M. (2015). Framing global biodiversity: IPBES between mother earth and ecosystem services. *Environmental Science & Policy*, 54, 487–496. https://doi.org/10.1016/j.envsci.2015.05.009

Brosius, J. P. (2006). What counts as local knowledge in global environmental assessments and conventions. In W. V. Reid, F. Berkes, T. J. Wilbanks, & D. Capistrano (Eds.), *Bridging scales and knowledge systems: Concepts and applications in ecosystem assessment* (pp. 129–144). Island Press.

Chan, K. M. A., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S., Gómez-Baggethun, E., Gould, R. K., Hannhas, N., Jax, K., Klain, S. C., Luck, G., Martín-López, B., Muraca, B., Norton, B., Ott, K., Pascual, U., Satterfield, T., Tadaki, M., Taggart, J., & Turner, N. J. (2016). Opinion: Why protect nature? Rethinking values and the environment. *Proceedings of the National Academy of Sciences of the United States of America*, 113(6), 1462–1465. https://doi.org/10.1073/pnas.1525002113

Chan, K. M. A., & Satterfield, T. (2020). The maturation of ecosystem services: Social and policy research expands, but whither biophysically informed valuation? *People and Nature*, 2(4), 1021–1060. https://doi.org/10.1002/pan3.10137

Chan, K. M. A., Satterfield, T., & Goldstein, J. (2012). Rethinking ecosystem services to better address and navigate cultural values. *Ecological Economics*, 74, 8–18. https://doi.org/10.1016/j.ecolecon.2011.11.011

Christie, M., Martin-Lopez, B., Church, A., Siwick, E., Szymonczyk, P., & Sauterel, J. M. (2019). Understanding the diversity of values of "Nature's contributions to people": Insights from the IPBES Assessment of Europe and Central Asia. *Sustainability Science*, 14(5), 1267–1282. https://doi.org/10.1007/s11625-019-00716-6

Clayton, S., & Opotow, S. (2003). Introduction: Identity and the natural environment. In S. Clayton & S. Opotow (Eds.), *Identity and the natural environment. The psychological significance of nature*. MIT Press.

Cooke, B., & Kothari, U. (2001). *Participation: The new tyranny?* Zed Books.

Coscieme, L., da Silva Hyldmo, H., Fernández-Llamazares, Á., Palomo, I., Mwampamba, T. H., Selomane, O., Sitas, N., Jaureguiberry, P., Takahashi, Y., Lim, M., Barral, M. P., Farinaci, J. S., Diaz José, J., Ghosh, S., Ojino, J., Alassaf, A., Baatuuwie, B. N., Balint, L., Basher, Z., … Valle, M. (2020). Multiple conceptualizations of nature are key to inclusivity and legitimacy in global environmental governance. *Environmental Science & Policy*, 104, 36–42. https://doi.org/10.1016/j.envsci.2019.10.018

Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R. V., Paruelo, J., Raskin, R. G., Sutton, P., & Van Den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*, 387, 253–260. https://doi.org/10.1038/387253a0

Crist, E. (2004). Against the social construction of nature and wilderness. *Environmental Ethics*, 26(1), 5–24. https://doi.org/10.5840/enviroethics200426138

De Groot, R. S. (1987). Environmental functions as a unifying concept for ecology and economics. *The Environmentalist*, 7(2), 105–109.

De Vos, A., Bezerra, C., & Roux, D. (2018). Relational values about nature in protected area research. *Current Opinion in Environmental Sustainability*, 35, 89–99. https://doi.org/10.1016/j.cosust.2018.10.018

Devine-Wright, P., & Clayton, S. (2010). Introduction to the special issue: Place, identity and environmental behaviour. *Journal of Environmental Psychology*, 30(3), 267–270. https://doi.org/10.1016/S0272-4944(10)00078-2

Díaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M., Ash, N., Larigauderie, A., Adhikari, J. R., Arico, S., Báldi, A., Bartuska, A., Baste, I. A., Bilgin, A., Brondizio, E., Chan, K. M. A., Figueroa, V. E., Duraiappah, A., Fischer, M., Hill, R., … Zlatanova, D. (2015). The IPBES Conceptual Framework—Connecting nature and people. *Current Opinion in Environmental Sustainability*, 14, 1–16. https://doi.org/10.1016/j.cosust.2014.11.002

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., Hill, R., Chan, K., Baste, I., Brauman, K., Polasky, S., Church, A., Lonsdale, M., Larigauderie, A., Leadley, P., van Oudenhoven, A., van der Plaat, F., Schröter, M., Lavorel, S., … Shirayama, Y. (2018). Assessing nature's contributions to people. *Science*, 359(6373), 270–272. https://doi.org/10.1126/science.aap8826

Ducarme, F., Flipo, F., & Couvet, D. (2020). How the diversity of human concepts of nature affects conservation of biodiversity. *Conservation Biology*, 35(3), 1019–1028. https://doi.org/10.1111/cobi.13639

Ehrlich, P., & Ehrlich, A. (1981). *Extinction. The causes and consequences of the disappearance of species*. Retrieved from http://hdl.handle.net/10822/788604

Escobar, A. (1998). Whose knowledge, whose nature? Biodiversity, conservation, and the political ecology of social movements. *Journal of Political Ecology*, 5(1), 53–82. https://doi.org/10.2458/v5i1.21397

Fish, R., Church, A., & Winter, M. (2016). Conceptualising cultural ecosystem services: A novel framework for research and critical engagement. *Ecosystem Services*, 21, 208–217. https://doi.org/10.1016/j.ecoser.2016.09.002

Gómez-Baggethun, E., & Ruiz-Pérez, M. (2011). Economic valuation and the commodification of ecosystem services. *Progress in Physical Geography*, 35(5), 613–628. https://doi.org/10.1177/0309133311421708

Görg, C. (2003). *Regulation der Naturverhältnisse. Zu einer kritischen Theorie der ökologischen Krise*. Westfälisches Dampfboot.

Görg, C. (2004). The construction of societal relationships with nature. *Poiesis & Praxis*, 3(1–2), 22–36. https://doi.org/10.1007/s10202-004-0066-5

Görg, C. (2010). Vom Klimaschutz zur Anpassung: Gesellschaftliche Naturverhältnisse im Klimawandel. In M. Voss (Ed.), *Der Klimawandel*. VS Verlag für Sozialwissenschaften. https://doi.org/10.1007/978-3-531-92258-4_20

Gould, R., Klain, S., Ardoin, N., Satterfield, T., Woodside, U., Hannahs, N., Daily, G., & Chan, K. (2014). A Protocol for eliciting nonmaterial values through a cultural ecosystem services frame. *Conservation Biology*, 29(2), 575–586. https://doi.org/10.1111/cobi.12407

Gould, R. K., Adams, A., & Vivanco, L. (2020). Looking into the dragons of cultural ecosystem services. *Ecosystems and People*, 16(1), 257–272. https://doi.org/10.1080/26395916.2020.1815841

Greider, T., & Garkovich, L. (1994). Landscapes: The social construction of nature and the environment. *Rural Sociology*, 59(1), 1–24. https://doi.org/10.1111/j.1549-0831.1994.tb00519.x

Grenni, S., Soini, K., & Horlings, L. G. (2020). The inner dimension of sustainability transformation: How sense of place and values can support sustainable place-shaping. *Sustainability Science*, 15(2), 411–422. https://doi.org/10.1007/s11625-019-00743-3

Harrison, P. A., Dunford, R., Barton, D. N., Kelemen, E., Martín-López, B., Norton, L., Termansen, M., Saarikoski, H., Hendriks, K., Gómez-Baggethun, E., Czúcz, B., García-Llorente, M., Howard, D., Jacobs, S., Karlsen, M., Kopperoinen, L., Madsen, A., Rusch, G., Van Eupen, M., … Zulian, G. (2018). Selecting methods for ecosystem service assessment: A decision tree approach. *Ecosystem Services*, 29(C), 481–498. https://doi.org/10.1016/j.ecoser.2017.09.016

Himes, A., & Muraca, B. (2018). Relational values: The key to pluralistic valuation of ecosystem services. *Current Opinion in Environmental Sustainability*, 35, 1–7. https://doi.org/10.1016/j.cosust.2018.09.005

Horcea-Milcu, A. I., Abson, D. J., Apetrei, C. I., Duse, I. A., Freeth, R., Riechers, M., Lam, D., Dorninger, C., & Lang, D. J. (2019). Values in transformational sustainability science: Four perspectives for change. *Sustainability Science*, 14(5), 1425–1437. https://doi.org/10.1007/s11625-019-00656-1

Hummel, D., Jahn, T., Keil, F., Liehr, S., & Stieß, I. (2017). Social ecology as critical, transdisciplinary science—Conceptualizing, analyzing and shaping societal relations to nature. *Sustainability*, 9(7), 1050. https://doi.org/10.3390/su9071050

Ingold, T. (2000). *The perception of the environment: Essays on livelihood, dwelling and skill*. Routledge.

Jacobs, S., Dendoncker, N., Martín-López, B., Barton, D. N., Gomez-Baggethun, E., Boeraeve, F., McGrath, F. N., Vierikko, K., Geneletti, D., Sevecke, K. J., Pipart, N., Primmer, E., Mederly, P., Schmidt, S., Aragão, A., Baral, H., Bark, R. H., Briceno, T., Brogna, T., … Washbourne, C. L. (2016). A new valuation school: Integrating diverse values of nature in resource and land use decisions. *Ecosystem Services*, 22(B), 213–220. https://doi.org/10.1016/j.ecoser.2016.11.007

Jacobs, S., Martín-López, B., Barton, D. N., Dunford, R., Harrison, P. A., Kelemen, E., Saarikoski, H., Termansen, M., García-Llorente, M., Gómez-Baggethun, E., Kopperoinen, L., Luque, S., Palomo, I., Priess, J. A., Rusch, G. M., Tenerelli, P., Turkelboom, F., Demeyer, R., Hauck, J., … Smith, R. (2018). The means determine the end–pursuing integrated valuation in practice. *Ecosystem Services*, 29(C), 515–528. https://doi.org/10.1016/j.ecoser.2017.07.011

Jacobs, S., Zafra-Calvo, N., Gonzalez-Jimenez, D., Guibrunet, L., Benessaiah, K., Berghöfer, A., Chaves-Chaparro, J., Díaz, S., Gomez-Baggethun, E., Lele, S., Martín-López, B., Masterson, V. A., Merçon, J., Moersberger, H., Muraca, B., Norström, A., O'Farrell, P., Ordonez, J. C., Prieur-Richard, A.-H., … Balvanera, P. (2020). Use your power for good: Plural valuation of nature–the Oaxaca statement. *Global Sustainability*, 3, E8. https://doi.org/10.1017/sus.2020.2

James, S. P. (2016). The trouble with environmental values. *Environmental Values*, 25(2), 131–144. https://doi.org/10.3197/096327116X14552114338747

Jax, K., Calestani, M., Chan, K. M., Eser, U., Keune, H., Muraca, B., O'Brien, L., Potthast, T., Voget-Kleschin, L., & Wittmer, H. (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. https://doi.org/10.1016/j.cosust.2018.10.009

Jax, K., Furman, E., Saarikoski, H., Barton, D. N., Delbaere, B., Dick, J., Delbaere, B., Duke, G., Görg, C., Gomez-Baggethun, E., Harrison, P., Maes, J., Perez-Soba, M., Turkelboom, F., Saarela, S. R., Van Dijk, J., & Watt, A. D. (2018). Handling a messy world: Lessons learned when trying to make the ecosystem services concept operational. *Ecosystem Services*, 29(C), 415–427. https://doi.org/10.1016/j.ecoser.2017.08.001

Kadykalo, A. N., López-Rodriguez, M. D., Ainscough, J., Droste, N., Ryu, H., Ávila-Flores, G., Le Clec'h, S., Muñoz, M. C., Nilsson, L., Rana, S., Sarkar, P., Sevecke, K. J., & Harmáčková, Z. V. (2019). Disentangling 'ecosystem services' and 'nature's contributions to people'. *Ecosystems and People*, 15(1), 269–287. https://doi.org/10.1080/26395916.2019.1669713

Kaltenborn, B. P. (1998). Effects of sense of place on responses to environmental impacts: A study among residents in Svalbard in the Norwegian high Arctic. *Applied Geography*, 18(2), 169–189. https://doi.org/10.1016/S0143-6228(98)00002-2

Kenter, J. O. (2018). IPBES: Don't throw out the baby whilst keeping the bathwater; Put people's values central, not nature's contributions. *Ecosystem Services*, 33(A), 40–43. https://doi.org/10.1016/j.ecoser.2018.08.002

Kenter, J. O., O'Brien, L., Hockley, N., Ravenscroft, N., Fazey, I., Irvine, K. N., Reed, M., Christie, M., Brady, E., Bryce, R., Church, A., Cooper, N., Davies, A., Evely, A., Everard, M., Fish, R., Fisher, J., Jobstvogt, N., Molloy, C., … Williams, S. (2015). What are shared and social values of ecosystems? *Ecological Economics*, 111, 86–99. https://doi.org/10.1016/j.ecolecon.2015.01.006

Kenter, J. O., Raymond, C. M., Van Riper, C. J., Azzopardi, E., Brear, M. R., Calcagni, F., Christie, I., Christie, M., Fordham, A., Gould, R., Ives, C., Hejnowicz, A., Gunton, A., Horcea-Milcu, A., Kendal, D., Kronenberg, J., Massenberg, J., O'Connor, S., Ravenscroft, N., … Thankappan, S. (2019). Loving the mess: Navigating diversity and conflict in social values for sustainability. *Sustainability Science*, 14(5), 1439–1461. https://doi.org/10.1007/s11625-019-00726-4

Keulartz, J. (2013). Conservation through commodification? *Ethics, Policy & Environment*, 16(3), 297–307. https://doi.org/10.1080/21550085.2013.843379

Kirchhoff, T. (2012). Pivotal cultural values of nature cannot be integrated into the ecosystem services framework. *Proceedings of the National Academy of Sciences of the United States of America*, 109(46), E3146. https://doi.org/10.1073/pnas.1212409109

Kirchhoff, T. (2019). Abandoning the concept of cultural ecosystem services, or against natural–scientific imperialism. *BioScience*, 69(3), 220–227. https://doi.org/10.1093/biosci/biz007

Klain, S. C., Satterfield, T. A., & Chan, K. M. A. (2014). What matters and why? Ecosystem services and their bundled qualities. *Ecological Economics*, 107, 310–320. https://doi.org/10.1016/j.ecolecon.2014.09.003

Kronenberg, J., & Andersson, E. (2019). Integrating social values with other value dimensions: Parallel use vs. combination vs. full integration. *Sustainability Science*, 14(5), 1283–1295. https://doi.org/10.1007/s11625-019-00688-7

Low, S., & Lawrence-Zúñiga, D. (2003). *The anthropology of space and place*. Blackwell.

Maffi, L. (Ed.). (2001). *On biocultural diversity. Linking language, knowledge, and the environment*. Smithsonian Institution Press.

Manzo, L., & Devine-Wright, P. (2013). *Place attachment: Advances in theory, methods and applications*. Routledge. https://doi.org/10.4324/9780203757765

Melathopoulos, A., & Stoner, A. (2015). Critique and transformation: On the hypothetical nature of ecosystem service value and its neo-Marxist, liberal and pragmatist criticisms. *Ecological Economics*, 117, 173–181.

Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being-synthesis*. *Island Press*.

Muraca, B. (2011). The map of moral significance: A new axiological matrix for environmental ethics. *Environmental Values*, 20(3), 375–396. https://doi.org/10.3197/096327111X13077055166063

Muradian, R., & Gómez-Baggethun, E. (2021). Beyond ecosystem services and nature's contributions: Is it time to leave utilitarian environmentalism behind? *Ecological Economics*, 185, 107038. https://doi.org/10.1016/j.ecolecon.2021.107038

Neuteleers, S., Deliège, G., & Melle, U. (2020). Intrinsic values and the life framework of values: Why we should go back to basics—Comment to O'Connor and Kenter (2019). *Sustainability Science*, 16, 313–316. https://doi.org/10.1007/s11625-020-00825-7

Neuteleers, S., & Engelen, B. (2015). Talking money: How market-based valuation can undermine environmental protection. *Ecological Economics*, 117, 253–260.

Norgaard, R. B. (2010). Ecosystem services: From eye-opening metaphor to complexity blinder. *Ecological Economics*, 69(6), 1219–1227. https://doi.org/10.1016/j.ecolecon.2009.11.009

O'Connor, S., & Kenter, J. O. (2019). Making intrinsic values work; Integrating intrinsic values of the more-than-human world through the Life Framework of Values. *Sustainability Science*, 14(5), 1247–1265. https://doi.org/10.1007/s11625-019-00715-7

O'Gorman, E. (2014). Belonging. *Environmental Humanities*, 5(1), 283–286. https://doi.org/10.1215/22011919-3615523

Otterspeer, I. (2018). *Welche Argumentationskategorien werden in der Debatte um den Wolf in Deutschland sichtbar? Inwiefern werden biologische Grundlagen berücksichtigt?* (Unpublished bachelor's thesis). Leipzig University.

Pascual, U., Balvanera, P., Díaz, S., Pataki, G., Roth, E., Stenseke, M., Watson, R. T., Dessane, E. B., Islar, M., Kelemen, E., Maris, V., Quaas, M., Subramanian, S. M., Wittmer, H., Adlan, A., Ahn, S., Al-Hafedh, Y. S., Amankwah, E., Stanley, T. A., … Yagi, N. (2017). Valuing nature's contributions to people: The IPBES approach. *Current Opinion in Environmental Sustainability*, 26, 7–16. https://doi.org/10.1016/j.cosust.2016.12.006

Pedynowski, D. (2003). Science(s)—Which, when and whose? Probing the metanarrative of scientific knowledge in the social construction of nature. *Progress in Human Geography*, 27(6), 735–752. https://doi.org/10.1191/0309132503ph459oa

Peterson, G. D., Harmáčková, Z. V., Meacham, M., Queiroz, C., Jiménez-Aceituno, A., Kuiper, J. J., Malmborg, K., Sitas, N. E., & Bennett, E. M. (2018). Welcoming different perspectives in IPBES. *Ecology and Society*, 23(1), 39. https://doi.org/10.5751/ES-10134-230139

Pröpper, M., & Haupts, F. (2014). The culturality of ecosystem services. Emphasizing process and transformation. *Ecological Economics*, 108, 28–35. https://doi.org/10.1016/j.ecolecon.2014.09.023

Rawluk, A., Ford, R., Anderson, N., & Williams, K. (2019). Exploring multiple dimensions of values and valuing: A conceptual framework for mapping and translating values for social-ecological research and practice. *Sustainability Science*, 14(5), 1187–1200. https://doi.org/10.1007/s11625-018-0639-1

Raymond, C. M., Kenter, J. O., van Riper, C. J., Rawluk, A., & Kendal, D. (2019). Editorial overview: Theoretical traditions in social values for sustainability. *Sustainability Science*, 14(5), 1173–1185. https://doi.org/10.1007/s11625-019-00723-7

Raymond, C. M., Singh, G. G., Benessaiah, K., Bernhardt, J. R., Levine, J., Nelson, H., Turner, N. J., Norton, B., Tam, J., & Chan, K. M. (2013). Ecosystem services and beyond: Using multiple metaphors to understand human-environment relationships. *BioScience*, 63(7), 536–546. https://doi.org/10.1525/bio.2013.63.7.7

Raymond, I. J., & Raymond, C. M. (2019). Positive psychology perspectives on social values and their application to intentionally delivered sustainability interventions. *Sustainability Science*, 14(5), 1381–1393. https://doi.org/10.1007/s11625-019-00705-9

Reinhardt, I., Ansorge, H., Collet, S., Fritsch, G., Kluth, G., Lippitsch, P., Nowak, C., Szentiks, C. A., & Ritz, M. (2021). Erkenntnisse zur Wiederausbreitung des Wolfs in Deutschland (Insights from wolf recolonisation in Germany). *Natur und Landschaft*, 96(1), 19–26.

Ricoeur, P. (1992). Narrative Identity. In D. Wood (Ed.), *On Paul Ricoeur: Narrative and interpretation* (pp. 188–199). Routledge.

Rozzi, R. (2018). Biocultural homogenization: A wicked problem in the anthropocene. In R. Rozzi, R. H. May Jr., F. S. Chapin III, F. Massardo, I. Klaver, A. Pauchard, M. A. Nuñez, & D. Simberloff (Eds.), *From biocultural homogenization to biocultural conservation*, Springer. 10.1007/978-3-319-99513-7_2

Rozzi, R., Massardo, F., Berghöfer, A., Anderson, C., Mansilla, A., Mansilla, M., Plana, J., Berghöfer, U., Araya, P., & Barros, E. (2006). *Reserve de Biosfera Cabo de Hornos. Documento de Base para la Incorporacion del Territorio Insular del Cabo de Hornos a la Red Mundial de Reservas de Biosferas*. Punta Arenas.

Rozzi, R., & Poole, A. (2011). Habitats–Habits–Inhabitants. A biocultural triad to promote sustainable cultures. In O. Parodi, I. Ayestaran, & G. Banse (Eds.), *Sustainable development: Relationships to culture, knowledge and ethics*. KIT Scientific Publishing.

Schröter, M., Crouzat, E., Hölting, L., Massenberg, J., Rode, J., Hanisch, M., Kabisch, N., Palliwoda, J., Priess, J., Seppelt, R., & Beckmann, M. (2021). Assumptions in ecosystem service assessments: Increasing transparency for conservation. *Ambio*, 50, 289–300.

Schüttler, E., Rozzi, R., & Jax, K. (2011). Towards a societal discourse on invasive species management: A case study of public perceptions of mink and beavers in Cape Horn. *Journal for Nature Conservation*, 19(3), 175–184. https://doi.org/10.1016/j.jnc.2010.12.001

Soulé, M. E., & Lease, G. (1995). Preface. In M. E. Soulé & G. Lease (Eds.), *Reinventing nature? Responses to postmodern deconstruction*. Island Press.

Stephenson, J. (2008). The Cultural Values Model: An integrated approach to values in landscapes. *Landscape and Urban Planning*, 84, 127–139. https://doi.org/10.1016/j.landurbplan.2007.07.003

TEEB. (2010). *The economics of ecosystems and biodiversity: Ecological and economic foundations*. Routledge.

Turner, N. J., Gregory, R., Brooks, C., Failing, L., & Satterfield, T. (2008). From invisibility to transparency: Identifying the implications. *Ecology and Society*, 13(2), 7. Retrieved from http://www.jstor.org/stable/26267989

UK National Ecosystem Assessment. (2011). *The UK National Ecosystem Assessment: Synthesis of key findings*. UNEP WCMC.

UNEP. (2014). Conceptual framework for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Decision IPBES-2/4. Report of the second session of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [online]. Retrieved from https://ipbes.net/document-library-catalogue-decision-ipbes-24

UNEP. (2016). IPBES/4/INF/1: Preliminary guide regarding diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services (deliverable 3(d)). Report of the Fourth Session of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [online]. Retrieved from http://www.ipbes.net/sites/default/files/downloads/IPBES-4-INF-13_EN.pdf

UNESCO/MAB. (2008). Madrid action plan for biosphere reserves [online]. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000163301/PDF/163301eng.pdf.multi

von Droste, B., Plachter, H., & Rössler, M. (1995). *Cultural landscapes of universal value*. Gustav Fischer.

Williams, D. R., & Stewart, S. I. (1998). Sense of place: An elusive concept that is finding a home in ecosystem management. *Journal of Forestry*, 96(5), 18–23. https://doi.org/10.1093/jof/96.5.18

Zent, E. (2015). Unfurling western notions of nature and Amerindian alternatives. *Ethics of Science and Environmental Policies*, 15(2), 1–19.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.