Chapter 2.[1] Conceptualizing the diverse values of nature and their contributions to people

Supplementary material

The designations employed and the presentation of material on the maps used in the assessment do not imply the expression of any opinion whatsoever on the part of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. These maps have been prepared or used for the sole purpose of facilitating the assessment of the broad biogeographical areas represented therein.

[1] This is the final text version of the supplementary material of Chapter 2 of the IPBES methodological assessment of the diverse values and valuation of nature (https://doi.org/10.5281/zenodo.6493134).

Annex 2.1. Cross-chapter conceptualization of power dimensions in the context of the values of nature, valuation and decision-making

In a generic way, power can be defined as the capacity of actors to mobilize agency, resources, and discourses, as well as to rely on/shape institutions, to achieve a goal. A dialectical understanding of power implies recognizing that the capacity of one actor can inhibit the capacity of another actor, and that power can be both constraining and enabling (Avelino, 2017). Power analysis is central to the understanding of the values of nature, valuation processes, and decision-making associated with nature and NCP (nature's contributions to people). As the field of political ecology has long shown, the consideration of power is key to understanding the ways that human-nature relationships take shape through time and in different spaces (Perreault et al., 2015). Power relations shape which values, institutions, and forms of knowledge prevail; how actors are differently empowered within decision processes; and the possibilities and obstacles for change within those processes (Radkau, 2013). Extra-human forces are also powerful, and many IPLC and cultural traditions view natural forces as powerful. For example, volcanoes, sun, or wind, are entities with agency and power, and in some cases, this nature-based power can be conveyed through medicine persons or shamans. Political ecologists and philosophers have also sought to theorize the role of material nature in shaping social processes and the exercise of power, with often-unacknowledged debts to ILK philosophies (Clark, 2010; Mitchell, 201; Latour, 1993; Todd, 2016).

In this conceptual note, a focus will be given to the power relationship between people and how this relationship plays out with respect to nature.[2] Power analysis provides insight into questions such as: Who defines nature? Who makes decisions about nature/NCP? Which values are considered in decision-making processes? Who benefits or loses from particular decisions? Why are some values neglected and others imposed? How do power structures influence values' confrontation? How do values change over time and space? How do discourses shape human-nature relationships (worldviews, identities, and values)? What knowledge systems (and associated values) are privileged/obscured in nature's framing and decision-making? What types of values tend to be prioritized or marginalized, depending on how power is exercised through diverse institutions (i.e., norms, legal rules, practices)? Why do we have those institutions, and whose values do they represent?

The aim of this conceptual note is to present a classification of power dimensions relevant to understanding the values of nature, valuation, and decision-making processes. The classification was constructed based on several interdisciplinary frameworks and reviews of the literature analyzing power in the environmental field. Some of these works emphasize the role of institutions in the analysis of power (Epstein et al., 2014; Bennet et al., 2018; Brisbois et al., 2018; Kashwan et al., 2019), while others are developed from the fields of ecological economics (Lorenz, 2017), political ecology (Svarstad et al., 2018) and natural resources management (Raik et al., 2008). These frameworks or reviews all recognize the need to integrate a multidimensional analysis of power in relation to nature.

This concept note is structured as follows. First, it presents various perspectives on the concept of power. Next, the relations between power and institutions are analyzed, illustrating the role of institutions as power-carriers and linking the analysis of power to the IPBES conceptual framework.

[2] In this concept note it is recognized that the term 'nature' does not translate across all cultures and contexts. The way 'nature' is understood and defined is also a power exercise. In Western culture, nature is usually separated from the human world, yet in other cultures is recalled as part of the human world and includes non-living organisms such as water, rocks, and entire landscapes. Here, the term is used throughout, to maintain consistency with IPBES terminology used in the assessment. Nature in this document should be interpreted broadly to refer to biophysical processes, environments, and systems of life, inclusive of humans and their role in these systems (see *Chapter 1*).

The final section identifies important power dimensions for considering values, valuation, and decision-making, linking the concept of power to key dimensions of the Values Assessment.

Power: a key (and contested) concept regarding the analysis of human-nature relationships and values

The notion of power has been addressed by a diversity of fields related to environmental studies, including political science, political ecology, history, sociology, anthropology, political economy, and geography, among others. The analysis of power and its definition is a contested field due to the different ontological and epistemological perspectives regarding this concept (Avelino, 2021). In this context, power analysis reflects the agency-structure debate within the philosophy of science and social sciences (Lorenz, 2017). The structural perspective suggests that power manifests itself through social structures (Gramsci, 1971; Arendt, 1972), which operate under a logic that more or less determines their operation and effects (Bennet et al., 2018). These social structures can include capitalist markets, socially-determined gender roles, class relations, or political structures such as democratic/authoritarian governance systems and norms (Bennet et al., 2018). From the structural perspective, power is exercised without (necessarily) implying conscious intent or accountability (Svarstad et al., 2018). In the environmental field, and especially in the field of political ecology, the structuralist perspective on power has been influenced by Marxist political economy (Castree et al. 2015; Perreault et al., 2015; Bennet et al., 2018; Svarstad et al., 2018). Gramsci's (1971) notion of hegemony (i.e., a system of dominant ideas that achieves consent from the powerless) has also been used to analyze power in a structural sense (Lorenz, 2017; Bennet et al., 2018).

On the other hand, one of the most common understandings of power comes from an agency (actor-oriented) perspective (Long, 2001). Within this perspective, it is recognized that actors can consciously and deliberately pursue their intentions (Lorenz, 2017). Power is always being enforced by actors that exercise or try to exercise power (Svarstad et al., 2018). Actors' intentions can be constrained or enabled by other actors' exercise of power or by social structures (Svarstad et al., 2018). For example, some resistance processes or mobilizations of less-powerful actors who seek to protect their interests and values have been analyzed through actor-oriented perspectives (Kashwan et al., 2019). Classical contributions to actor-oriented perspectives include Hobbes's (2010 [1651]) instrumental notion of power as the ability to acquire something (Lorenz, 2017), or Max Weber's (Weber 1964 [1947]) multidimensional approach to power, wealth, and prestige, defining power as a person's ability to get his way despite the resistance of others (Svarstad et al., 2018).

It is important to understand that structural and agency-oriented perspectives are not necessarily counterposed; diverse tendencies in these traditions have theorized how structure and agency interact to shape power relations (Lorenz, 2017). Lukes (2005 [1974]) highlighted the multidimensionality of power through the metaphor of 'power faces/dimensions': the power to influence decision making (1st face of power), the power to set the agenda or to influence who participates and what is included or excluded (2nd face of power), and the power to shape people's interests and wants without their awareness of the influence (3rd face of power). Anthony Giddens (1984) developed 'structuration theory' in which structure and agency create and reproduce each other: social structures are created by actors' agency, while at the same time actors' agency is produced by social structures (Lorenz, 2017; Fletcher & Büscher, 2018).

On a different analytical and ontological level, Michel Foucault argued that both structure and agency are constructed by discursive power strategies (Lorenz, 2017). From this post-structural perspective, discourses are defined as systems of ideas and concepts that are produced, reproduced, and transformed through social practices, providing meaning to physical and social realities and shaping subjective identities (Hajer 1995, Bennet et al., 2018). Further, Foucault (1977, 1980, 1991) claimed that power and knowledge are intrinsically related in power/knowledge complexes, which produce specific forms and techniques, or ways of exercising power (Lorenz, 2017). All forms and expressions

of knowledge manifest power relations, in the sense that they involve particular productions of 'truth' that reinforce certain values and worldviews (Foucault, 1972). In other words, there is no knowledge that is free of power relations, but this does not mean that these relations are necessarily repressive. Changes in the discourses and types of knowledge that achieve legitimacy in decision-making processes may change how and by whom power is exercised in those processes, while different ways of exercising power involve different ways of producing and mobilizing expert knowledge (Rose, 1993).

Power/knowledge enables the governance of actors, spaces, and nature (Cleaver and Whaley, 2018), and also shapes dominant concepts of nature (ontologies), actors' beliefs about who they are (identities), and how they relate with the world (subjectivities) (Bennet et al. 2018). Identities such as gender, nationality, class are defined as historically specific, contingent, and relational with regard to the dominant power forces (Lorenz, 2017; Bennet et al., 2018). Another concept that has been used in post-structuralist analysis of power is that of governmentality (Foucault, 2004), or the "organized and layered practices through which we are governed and through which, consciously and unconsciously, we govern ourselves" (Cleaver and Whaley, 2018: 6; Agrawal, 2005; Rose et al., 2006; Boelens et al., 2013). Political ecologists have used this concept to analyze power in the context of environmental governance (e.g., 'environmentality' in Agrawal, 2005).

The concept of governmentality turns attention to the genesis of various rationalities of governing (with particular attention to the history of liberalism), and how these rationalities are implicated in practices 'conducting conduct' through state and non-state institutions (Rose 1993; Foucault 2007). Most importantly, from a post-structuralist perspective, power is not understood as something to be possessed in zero-sum terms, but as practices of influence and control that are exercised by diverse actors in geographically and historically specific ways. This, cuts short the supposed binary between freedom and coercion. As Rose (2004:4) puts it: "to govern is to presuppose the freedom of the governed. To govern human beings is not to crush their capacity to act, but to acknowledge it and to utilize it for one's own objectives." In other words, government as a practice facilitates actors' capacities to act *in certain ways*.

The above presentation of perspectives on power, which is not exhaustive or complete, demonstrates the difficulty of defining the concept of power since there is a risk of excluding some relevant perspectives or concepts. For instance, this review focuses mainly on Euro-American traditions and thereby is limited in the diversity of perspectives it represents. However, there is a convergence of calls from scholars in the environmental fields such as ecological economics (Lorenz, 2017), institutionalism (Bennet et al. 2018; Brisbois et al. 2018; Kashwan et al. 2019), sustainability transformations (Avelino, 2021), and political ecology (Svarstad et al., 2018) towards integrating multiple perspectives in power analysis.

Advances towards the integration of power and institutional analysis in the context of nature

With the aim of identifying some relevant and practical dimensions for the analysis of power in relation to nature/NCP, some frameworks addressing the multidimensional aspects of power and its relations with institutions were reviewed. Institutions are the norms, legal rules, conventions, and practices that are established in a society (Ostrom, 1990, 2005; Vatn, 2005; Cleaver and Whaley, 2018). Institutions provide expectations about the behaviour of people while protecting certain broad values and interests (Vatn, 2005). In this sense, institutions are normative social structures that frame how people should behave or what goals or values are considered important to people in a particular context (Ostrom, 2005). Institutions also provide symbolic meanings, by also "specifying what one can imagine oneself doing in a given context" (Hall & Taylor, 1996: 948). Therefore, institutions are power-carriers: they align and produce people's identities/behaviour/action towards particular values and interests.

An institutional lens to the analysis of power was considered important given that the IPBES conceptual framework recognizes that institutions determine how power is exercised (Díaz et al., 2015). In turn, in *Chapter 1*, a theory of change is depicted highlighting how power relations, institutions, and contexts modulate the influence of values and valuation on decision-making, outcomes, drivers of change, and transformations. *Chapter 2* focuses on the role of institutions on the values prioritized by actors and how institutions influence valuation and decision-making processes. The latter approach is explored in detail in *Chapter 3* (valuation methods) and in *Chapter 4* (decision-making) of the values assessment.

Although fields like critical institutionalism have addressed power as a central concept (Cleaver, 2012; Hall et al., 2014; Cleaver and de Koning, 2015; Cleaver and Whaley, 2018), several institutionally oriented frameworks have been criticized for lacking a focus on power issues (Agrawal, 2005; Theesfeld, 2009 ; Clement, 2010 ; Kashwan, 2016). Revised versions have recently emerged, highlighting the intricate and dynamic relationships between institutions and power and devoting attention to actor-centred, structural, and discursive approaches to power. Below a summary of each reviewed framework is provided.

The work of Epstein et al., (2014) assesses how diverse concepts of power can be analysed within institutional approaches to study social-ecological systems. Some of the dimensions of power the authors analysed include the power of an actor as depending on (i) the rights and responsibilities regarding the use of nature; (ii) the control over collective choice situations and the economic value of nature/NCP; and (iii) historically persistent institutions (path dependence). The authors also include power dimensions related to an actor's (perceived) lack of power to mobilize their values and interests in collective choice processes, because they are excluded from these processes or because, when able to participate, their values are not reflected in the resulting policies.

The study of Brisbois et al., (2018) provides a conceptual framework that integrates power analysis in the institutional analysis and development (IAD) framework. Brisbois et al.'s framework relies on the work of Lukes (2005 [1974]) on the three faces/dimensions of power. The first dimension of power is defined by the authors as the ability to prevail in decisions, despite opposition, which may explain the visible contestations in terms of nature-related decision-making. The second dimension addresses the ways in which certain issues are excluded from decision-making agendas. This may be the result of the rules/institutions in place which favour/exclude certain values, and which may result in covert conflicts. The third dimension of power addresses the ways in which dominant ideas, institutions, and values limit the articulation and consideration of alternatives. This way of exerting power may result in latent conflicts.

Bennet et al., (2018) developed a typology of relationships between power and institutions. The proposed typology recognizes that institutions are relationally placed within power dynamics at multiple scales. Therefore, power may influence institutions and institutions may also influence power. The typology revolves around the following questions: (i) how institutions can reinforce existing social structures (e.g., capitalistic markets, class relations); (ii) how social structures such as capitalistic markets and class relations shape the norms, legal rules, and conventions of a society; (iii) how norms, legal rules, and conventions shape discourses, knowledge, networks, and identities; and (iv) how discourses, networks, and ideas, influence the creation, function, or change of institutions.

Kashwan et al., (2019) developed a conceptual framework – a power in institutions matrix – that highlights the multiple dimensions of power involved in institutional development and change. The matrix includes three power forms that are in constant interaction and form each other: actors' 'power over' (i.e., constraining the opportunities and control of other actors); 'power to' (i.e., creating new opportunities and allowing relatively greater control to actors) and structural power (i.e., capacity for action that is socially structured). Further, through their power matrix, Kashwan et al., (2019) discussed specific 'power to' forms in which less powerful actors can advance their interests and

values in diverse arenas. For example, counter-power and resistance imply (i) mobilization against the status quo; (ii) promoting counter dominant agendas and policies; (iii) promoting other-regarding discourses and values to overcome collective action's barriers. Also, less powerful actors can craft institutional arrangements towards their interests and values from a bottom-up approach (crafting institutions) such as creating institutions that promote the participation of marginalized actors; promoting procedural justice as an agenda; and supporting discourses and values promoting plural institutions.

The analysis of the above institutionalism-based frameworks was complemented by revising other works addressing the multiple dimensions of power in the fields of ecological economics (Lorenz, 2017), political ecology (Svarstad et al., 2018); and natural resources (Raik et al., 2008). As a response to the absence of power analysis in neoclassical economics, Lorenz (2017) synthesized the main features of diverse power theories in order to promote power analysis in the field of ecological economics- a well-known field for its criticisms of neoclassical economics. Particularly, Lorenz highlights the main concern of power theories: What does power do? (Machiavelli, (1998 [1532]); What is power? (Hobbes, (2010 [1651]); constraining power (Dahl, 1957); agenda-setting/mobilization of bias (Bachrach and Baratz; 1962); the influence of actor A on the wants of B (Lukes, 2005 [1974]); domination of one social class over others/hegemony (Gramsci, 1971); power as a recursive and reciprocal process (Giddens, 1984); power in terms of strategies, techniques and functioning (Foucault, 1978; 1995 [1977]); and the interplay of structural and agential power (Hay, 2002; Jesso, 2005).

Svarstad et al., (2018) provide a review of power theories in political ecology: actor-oriented theories understanding power as being exercised by actors, neo-Marxist theories of power focusing on the power reproduced by capitalistic class relations, and post-structuralist Foucauldian theories focusing on discursive power. Raik et al., (2008) review some theoretical understandings of the concept of power and reflect on how power is exercised in natural resources management and conservation. They addressed diverse understandings of power: as coercion, as constraints, as consent production, and as the exercise of power within social structures.

Power dimensions in the context of values of nature, valuation, and decision-making processes

Based on both the review of multiple approaches to the notion of power (section above on *Power: a key (and contested) concept regarding the analysis of human-nature relationships and values*) and the frameworks for analysing power in the context of nature presented in the above section (i.e,. Raik et al., 2008; Epstein et al., 2014; Lorenz, 2017; Bennet et al., 2018; Brisbois et al., 2018; Kashwan et al., 2019; Svarstad et al., 2018); and also based on the expert knowledge of the authors of this conceptual note, five dimensions of power were identified as relevant for nature/NCP valuation and decision-making contexts. These power dimensions were identified within a process of several rounds of discussions between the authors according to the following aims: (i) addressing dimensions that provide attention to actor-centred, structural, and discursive forms of power; (ii) include dimensions that highlight the role of institutions in nature/NCP valuation and decision-making; (iii) convey power dimensions in a practical and accessible way to the broad audience of the values assessment.[3]

Power around nature/NCP is constantly disputed and enforced by actors that are part of power hierarchies. Power in the context of human-nature relationships can take multiple forms. Here we highlight five dimensions of power: discursive, framing, structural, rule-making, and operational power (*Figure SM2.1*). These power dimensions can influence an actor's capacities to pursue her/his interest and values, while at the same time actors may influence/shape these power dimensions. These

[3] The classification of power dimensions presented in this conceptual note will not perfectly fit the reviewed ones because they were the result of a synthetic analysis and because they were reframed in terms of the mentioned aims.

categories of power are not mutually exclusive, so in a given context they can reinforce or conflict with each other in multiple ways. Table SM2.1 presents a description of each power dimension, examples of possible value-related questions that may orient the analysis of power, and references to empirical examples presented in the Values Assessment.

The first dimension of power is *discursive power* - i.e., the power of discourses, narratives, or knowledge production to shape or construct worldviews, identities, truths, and values. This power dimension is central in the analysis of power from a post-structural perspective and political ecology (Bennet et al., 2018; Svarstad et al, 2018) and is highly influenced by Foucault's work on power. The analysis of discursive power highlights how dominant narratives and values reinforce the status quo by excluding other actors' narratives, worldviews, and values (e.g., shaping ideas of which environmental governance institutions are possible or desirable) (Feindt & Oels, 2005; Bennet et al., 2018). Discursive power does not only shape actors' preferences but also shapes reality itself as when environmental knowledge is produced and used to control people and nature (Bennet et al. 2018). However, less powerful actors may also have power (agency) to produce reality through their own discourses and day-to-day practices (Bennet et al., 2018; Kashwan et al., 2019). Discursive power is sometimes considered invisible because it operates at the level of actors' mentality (Brisbois et al., 2018).

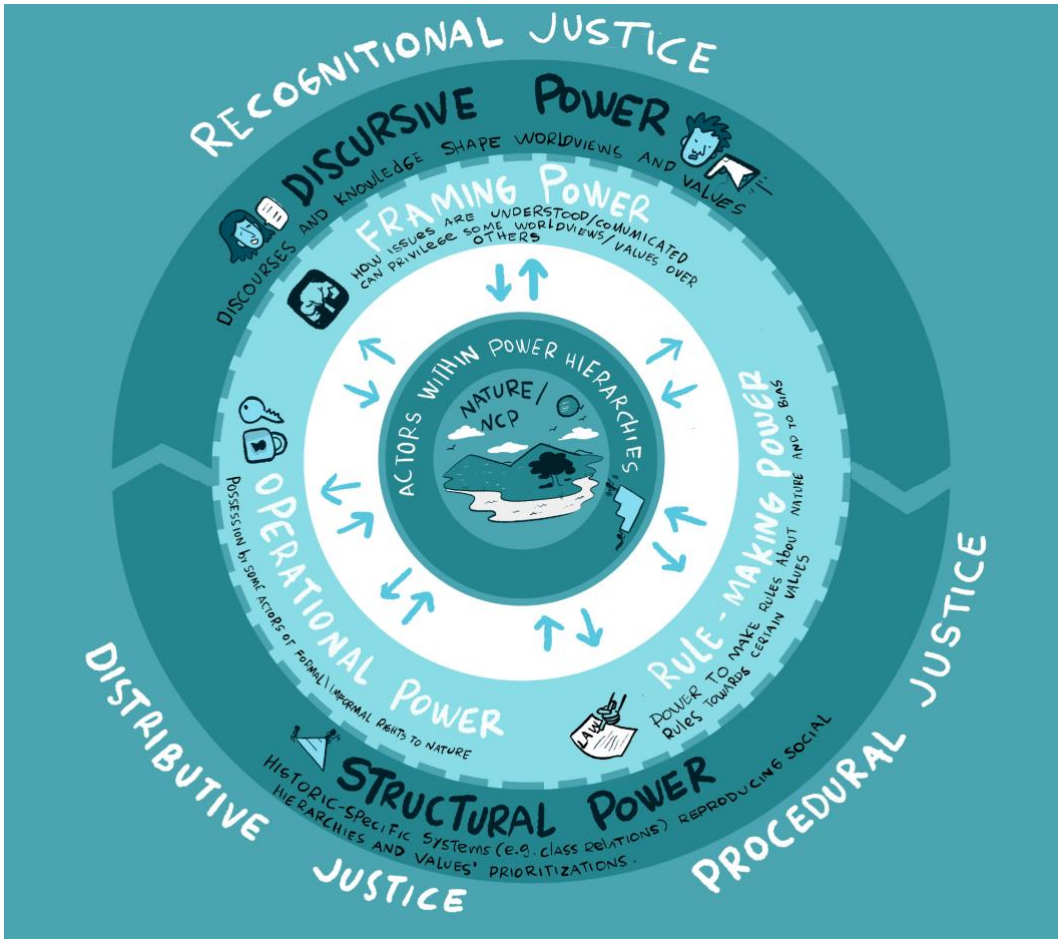

Figure SM2.1 Power and environmental justice dimensions in nature valuation and decision-making contexts

Some of the value-related questions associated with discursive power are: How do discourses, narratives, or knowledge production shape or construct worldviews, identities, and values? Who constructs/uses particular discourses and towards what interests and values? How do discourses, narratives, and knowledge production reinforce historical powerful structures and institutions

determining human-nature relationships? How do some actors use discourses, narratives, and knowledge production to oppose dominant discourses, power structures, and institutions? What worldviews and values are mobilized in these processes? For example, in the implementation of payment for ecosystem services schemes in Lima's watersheds, discursive power (e.g., water need for the "thirsty desert city") prioritized urban stakeholders' values and interests to the detriment of those of the local people, who were concerned with addressing historic environmental injustices and preserving their livelihoods (Bleeker & Vos, 2019).

Framing power is an important form of discursive power. It regards how issues are understood, communicated, and discussed in diverse contexts such as development projects, education, research, and valuation process. The analysis of framing power highlights how these processes, with their associated tools and technologies, may favour certain human-nature relationships (Linell et al., 2015; Muradian & Pascual, 2018), knowledge systems, rationalities, and values (Vatn, 2009). The way in which problems are understood, communicated, and discussed (i.e., problem "framing" (Miller, 2000) or "problematization" (Rose et al., 2006; see also *Chapter 4*) directly affects outcomes by privileging some values and forms of knowledge over others. Framing power converges with the concept of value articulating institutions developed in the field of critical institutionalism (Vatn, 2005). This concept stresses that valuation and decision-making processes are guided by rules/institutions that define who can participate, the type of process in which participation is allowed (group-based, individually-based), the valid knowledge systems and rationalities, and how the conclusions will be reached.

Examples of value-related questions associated with the framing power dimension include: Which worldviews and values are highlighted/obscured/excluded in decision-making and valuation contexts/environmental projects? Which knowledge systems and roles/rationalities are seen as valid and proper in such contexts? How do some actors contest dominant actors' framing of human-nature relationships, valid knowledge and proper roles, and what are the values associated with those conflicts? For instance, South American delegations opposed the ecosystem services concept in the context of the IPBES conceptual framework development, because it conflicted with their worldviews, knowledges, and values (Borie and Hulme, 2015). The framing was negotiated, and the final framework (Diaz et al., 2015) recognized both the concepts of ecosystem services (academic knowledge) and Mother Earth (ILK).

The third power dimension is *structural power*. This power dimension works through historic-specific socio-cultural, political, and economic systems (e.g., class, prestige or wealth-based relations, capitalistic market) that reproduce social positions and hierarchies among social groups and reinforce the prioritization of certain values (Bennet et al., 2018). Individuals exercise power over others because of their position in social structure and because of their role as defined by prevailing institutions (Raik et al., 2008). This power dimension also provides emphasis to the historically-specific social structures that account for the persistence of institutions determining access, use, and responsibilities over nature and NCP (Marshall and Alexandra, 2016) (i.e., path dependency). Structural power encompasses power forces that are external to actors and may act in invisible ways (i.e., often unacknowledged by actors) (Raik et al. 2008). Structural power influences how actors access and control nature and NCP, by influencing their positions, preferences, and actions, which at the same time reproduce power structures (Raik et al., 2008; Bennet et al., 2018). For example, political ecologists working in the framework of Marxist political economy have analyzed how, in a capitalist economy, capital accumulation – even in supposedly 'green' sectors – depends on the reproduction of class and caste-based relations and their attendant environmental and social injustices (Bennet et al., 2018; Svarstad et al., 2018). Scholars (e.g., Fletcher & Büscher, 2017; Kolinjivadi et al., 2017) have also examined how a market framing of environmental policies and projects (e.g., payment for ecosystem services) reinforces power relations that determine access and use of nature (Bennet et al., 2018).

Some of the questions related to structural power relations include: What values are highlighted or obscured by social structures such as socially-determined gender roles, class and caste-based relations, capitalistic markets? How do actors resist or transform social structures? What values are mobilized in such processes of resistance/ transformation? How do actors reproduce or reinforce human-nature relationships and values associated with social structures? For example, Bee (2019) discusses a national payment for ecosystem service program in Mexico that provides scores to communities with female legal representatives. In some cases, this incentive resulted in the reproduction of stereotypes about women (e.g., being valued because of their administrative and interpersonal skills). Moreover, the program limited women's participation in forest governance because they were mainly framed as instruments through which communities could gain access to the program/resources.

Structural power is manifested, for example, through rule-making power and operational power. This fourth power dimension - **rule-making power** - is defined as the power of actors to make rules about nature and NCP. Rule-making is a political process aimed at the establishment of formal or informal institutions regarding access, use, and responsibilities over nature/NCP (e.g., property/use rights, rules for watershed or landscape management). Rule-making power implies the power to exclude others, or to bias rule-making toward certain interests and values. Therefore, this power may appear as hidden.

Examples of value-related questions associated with the rule-making power dimension includes: Which/whose values are emphasized/obscured in rule-making processes about nature/nature's contributions to people (NCP)? What/whose values are left out in rule-making processes about nature and NCP? How do previously marginalized actors contest perceived injustices in rule-making processes about nature and NCP, and what counter-values do they promote? For example, in some participatory processes of watershed management plans, less powerful actors such as peasants are not usually integrated, thus some relational values are not reflected in land-use rules (e.g., prohibition of house developments or crops) (Cooney et al., 2015).

Finally, *operational power* refers to the power of actors bearing the above-mentioned formal or informal rights in nature/NCP to determine the use of these assets and therefore what and whose values are emphasized (Bromley, 2006). Such power also includes control and monitoring responsibilities that ensure people's compliance. The distribution of operational power through specifying property and use rights to nature and NCP play an important role in influencing both the distribution of income and the status of nature (Vatn 2015). Operational power takes place in on-ground day-to-day decisions, therefore rule-enforcing power and associated conflicts are somehow visible to the observer. Rule-making and operational power converge with two important categories in the institutional literature, where the rules that are operationalized in practice (operational-level institutions, Ostrom 2005) differ from the processes through which those rules are established (Collective-choice institutions, Ostrom 2005) (Morrison et al., 2019).

The analysis of operational power can integrate the following value-related questions: What conflicts around which/whose values arise regarding assigned rights on access, use and responsibilities about nature/NCP? How are these rights and responsibilities protected/disputed and by whom? How have actors permeated or transformed responsibilities, access and use about nature/NCP? Which/whose values have been emphasized/obscured in these processes?

The power dimensions described above may operate at diverse temporal and spatial scales that may not necessarily coincide with the scale of a given valuation or decision-making process. It is, therefore, necessary to understand how these processes are shaped by historical power relations that shape the authority that one actor may exercise over others, and the resources and practices used to exercise power including institutions, money/wealth, social status, and violence. One challenge of operationalizing the analysis of power is to understand its dialectical nature: the role of agency and

social structures and how they reinforce or produce each other, or how power may be constraining/disempowering but also of enabling/ empowering, how power can be exercised by dominant actors but also by other actors less powerful.

Table SM2.1 Power dimensions in the context of the values of nature, valuation and decision-making processes. Constructed with insights from Raik et al., 2008, Lorenz, 2017; Brisbois et al. 2018, Bennet et al 2018, Kashwan et al. 2019; Svarstad et al, 2018, Epstein et al., 2014.

Power dimension	Description	Value related questions	Examples
Discursive power	The power of discourses, narratives, or knowledge production to shape or construct worldviews, identities, truths, and values.	How do discourses, narratives, or knowledge production shape or construct worldviews, identities, and values? Who constructs/uses particular discourses, and towards what interests and values? How do discourses, narratives, and knowledge production reinforce historical powerful structures and institutions determining human-nature relationships? How do some actors use discourses, narratives, and knowledge production to oppose dominant discourses, power structures, and institutions? What worldviews and values are mobilized in these processes?	Philosophies of good living (e.g., Buen Vivir among indigenous people of South America, Minobimaatisiiwin among Anishinaabe and Cree people in North America, and Ubuntu in , Sub-Saharan Africa) generally promote a good quality of life through broad values that guide human-human and human-nature interconnections (e.g., reciprocity, harmony, respect, solidarity, responsibility, place-based identities, kinship with nature and self-determination). The IPLC philosophies of good living can also be used in discursive strategies to contradict traditional economic development discourses and indicators of well-being (discursive power). IPLC mobilization has led to integration of the values underpinning these philosophies in practices and policies, although with various levels of success and criticism. In South America, the IPLC discourse of *Buen vivir* has influenced States' rule-making power, and this notion has been formalized to some extent in the Ecuadorian and Bolivian constitutions.
Framing power	Refers to how issues are understood, communicated, and discussed in diverse contexts and their associated tools and technologies. Framing power affects outcomes by privileging some worldviews, values and forms of knowledge over others	Which worldviews and values are highlighted/obscured/excluded in decision-making and valuation contexts/environmental projects? Which knowledge systems and roles/rationalities are seen as valid and proper in such contexts? How do some actors contest dominant actors' framing of human-nature relationships, valid knowledge, and proper roles, and what are the values associated with those conflicts?	Gross Domestic Product (GDP) measures the market value of goods and services produced by a national economy and is used to indicate and compare the size of the economy between countries, and within countries. The measurement of social and economic progress through GDP implies a framing power. Due to its focus on monetary values of marketed goods, GDP is a poor measure of biodiversity and the values of nature, many of which are unpriced and outside of market evaluation. GDP reflects an instrumental view privileging monetary values: the multiple values of nature are largely reduced to the source of raw materials needed to produce goods and services. Although it is well-established that economic growth measured via GDP contributes to the deterioration of nature, economic growth strategies are predominant in national biodiversity strategy documents, demonstrating GDP's discursive power.
Structural power	Structural power works through historic-specific socio-cultural, political,	What values are highlighted or obscured by social structures such as socially-determined	In the Klamath River (United States), economic development projects (e.g., dams and physical infrastructure) which were part of the structural power of capital accumulation, led to the creation of public organizations that

	and economic systems (e.g., class relations, capitalist market) that reproduce social positions and hierarchies among social groups and reinforce the prioritization of certain values	gender roles, class and caste-based relations, and capitalist markets? How do actors resist or transform social structures? What values are mobilized in such processes of resistance/transformation? How do actors reproduce or reinforce human-nature relationships and values associated with social structures?	managed (rule-making power) the watershed based on a worldview aimed at regulating nature to increase economic output (instrumental value). This dominant worldview and management approach downplayed intrinsic values of nature (salmon conservation) and indigenous ways of life (relational values). Protests from the affected indigenous people and environmental groups led the dam operating company to launch a collaborative process aimed at negotiating conflicting values.
Rule-making power	The power of actors to make rules about nature and NCP, which may include the power to exclude others, or to bias rule-making toward certain interests and values.	Which/whose values are emphasized/obscured in rule-making processes about nature/NCP? What/whose values are left out in rule-making processes about nature and NCP? How do previously marginalized actors contest perceived injustices in rule-making processes about nature and NCP, and what counter-values do they promote?	In 2003 the mining company Vedanta Resources received approval to commence mining in the area near Niyamgiri mountain (Odisha, India), which is considered sacred by local indigenous peoples. Although the company obtained the license (operational power) under the condition of not clearing forestland, in 2008 the Indian Supreme court through its rule-making power approved the forest clearance. This verdict resulted in mass-scale demonstrations. In 2013, India's Supreme court reversed the earlier decision, ordering the indigenous people's right to worship their sacred mountain must be "protected and preserved" and that those with religious and cultural values associated with the area must be included in the decision-making process (rule-making power). It allowed the affected tribal villages to decide on the project via local referenda, who unanimously rejected the mining project (operational power).
Operational power	The possession by some actors of the formal or informal rights to nature/NCP, to determine the use of these assets and therefore what and whose values are emphasized.	What conflicts around which/whose values arise regarding assigned rights on access, use and, responsibilities about nature/NCP? How are these rights and responsibilities protected/disputed and by whom? How have actors influenced or transformed responsibilities, access, and use about nature/NCP ? Which/whose values have been emphasized/obscured in these processes?	While Environmental Impact Assessments are now required for major, environmentally-disruptive projects in most countries, a lack of procedural justice in many instances means that their influence on the outcomes of decisions are highly mixed. Without formal veto rights (operational power) for affected stakeholders, the articulation of diverse values in EIA processes often does not result in those values' recognition in outcomes. In many cases, powerful industry interests with deep ties to state and capitalist institutions (structural power) are able to utilize and engage the process to their advantage, satisfying formal requirements for consultation or public participation with little substantive impact on decision outcomes.

References

Agrawal A. (2005). Environmentality: Technologies of Government and the Making of Subjects. Chapel Hill: Duke University Press.

Avelino, F. (2017) Power in Sustainability Transitions: Analysing power and (dis)empowerment in transformative change towards sustainability. Environmental Policy and Governance. Vol. 27. DOI: 10.1002/eet.1777

Avelino, F. (2021). Theories of power and social change. Power contestations and their implications for research on social change and innovation. Journal of Political Power. 1-24. 10.1080/2158379X.2021.1875307.

Bachrach, P., Baratz, M.S. (1962). Two Faces of Power. American Political Science Review, 56 (4), 947–952.

Bee, B. (2019). Gendered spaces of payment for environmental services: A critical look, Geographical Review, 109:1, 87-107, DOI: 10.1111/gere.12292

Bennett, A., Acto, L., Epstein, G., Gruby, R. L., & Nenadovic, M. (2018). Embracing conceptual diversity to integrate power and institutional analysis: Introducing a relational typology. International Journal of the Commons, 12(2), 330–357. https://doi.org/10.18352/ijc.819

Bleeker, S., & Vos, J. (2019). Payment for ecosystem services in Lima's watersheds: power and imaginaries in an urban-rural hydrosocial territory. Water International, 44(2), 224–242. doi:10.1080/02508060.2019.1558809

Boelens R., Hoogesteger J. and Baud M. (2013). Water reform governmentality in Ecuador: Neoliberalism, centralization, and the restraining of polycentric authority and community rule-making. DOI: 10.1016/j.geoforum.2013.07.005.

Borie, M. & Hulme, M. (2015) Framing global biodiversity: IPBES between mother earth and ecosystem services, Environmental Science & Policy, 54: 487-496.

Bourdieu, P. (1977). Outline of a theory of practice. Cambridge: Cambridge University Press.

Brisbois, M. C., Morris, M., & de Loë, R. (2018). Augmenting the IAD framework to reveal power in collaborative governance – An illustrative application to resource industry dominated processes. World Development, 120:59-68.. doi:10.1016/j.worlddev.2018.02.017

Castree, N. (2015). Capitalism and the Marxist critique of political ecology. In T. Perreault, G. Bridge & J.McCarthy (Eds.), The Routledge Handbook of Political Ecology (pp. 279-292). Abingdon, United Kingdom:Routledge.

Clark, N. (2010). Inhuman nature: Sociable life on a dynamic planet. Sage Publications.

Cleaver, F. 2012. Development through bricolage: rethinking institutions for natural resource management. Earthscan, London, UK.

Cleaver, F., and J. de Koning. (2015). Furthering critical institutionalism. International Journal of the Commons 9(1):1-18. http://dx.doi.org/10.18352/ijc.605

Cleaver, F., and L. Whaley. (2018). Understanding process, power, and meaning in adaptive governance: a critical institutional reading. Ecology and Society 23(2):49.

Clement, F (2010). Analysing Decentralised Natural Resource Governance: Proposition for a 'Politicised' Institutional Analysis and Development Framework. Policy Sciences 43(2): 129–156. DOI: 10.1007/s11077-009-9100-8.

Cooney, R., Hunter, D., MacKinnon, K., Müller, E., Nelson, F., Oli, K., . . . Vavrova, L. (2015). Managing Resource Use and Development. In Kothari A., Worboys G., Lockwood M., Feary S., & Pulsford I. (Eds.), Protected Area Governance and Management (pp. 789-822). ANU Press.

Dahl, R.A. (1957). The Concept of Power. Behavioural Science, 2 (3), 201–215.

Díaz, S., Demissew, S., Joly, C., et al. (2015). A Rosetta Stone for nature's benefits to people. PLoS Biol. 13 (1) e1002040

Epstein G., Bennett A., Gruby R., Acton L., Nenadovic M. (2014). Studying power with the social-ecological system framework. Understanding Society and Natural Resources, eds Manfredo MJ, Vaske JJ, Rechkemmer A, Duke EA (Springer, Netherlands), pp 111–135

Fabinyi, M., Evans, L., & Foale, S. J. (2014). Social-ecological systems, social diversity, and power: Insights from anthropology and political ecology. Ecology and Society, 19(4), art28. https://doi.org/10.5751/ES-07029-190428
Fletcher, R. & Büscher, B. (2017). The PES Conceit: Revisiting the Relationship between Payments for Environmental Services and Neoliberal Conservation, Ecological Economics, 132: 224-231.
Fletcher, R., & Büscher, B. (2018). Neoliberalism in Denial in Actor-oriented PES Research? A Rejoinder to Van Hecken et al. (2018) and a Call for Justice. Ecological Economics. doi:10.1016/j.ecolecon.2018.04.007
Foucault, Michel (1972). The archaeology of knowledge. Pantheon Books. New York
Foucault, M. (1977). Discipline and Punish: The Birth of the Prison. New York: Random House LLC.
Foucault, M. (1980). Power/Knowledge: Selected Interviews and Other Writings, 1972–1977. New York: Pantheon.
Foucault, M. (1991). Governmentality. In The Foucault Effect: Studies in Governmentality, eds. G. Burchell, C. Gordon, and P. Miller. Chicago: University of Chicago Press.
Foucault, M. (2004). Sécurité, territoire, population. éditions du Seuil.
Foucault M. (2007). Security, Territory, Population. Burchell G (ed.). Basingstoke: Palgrave Macmillan. DOI: 10.1057/9780230245075.
Giddens, A. (1984). The Constitution of Society: Outline of the Theory of Structuration. Cambridge: Polity
Gramsci, A. (1971). Selections from the Prison Notebooks. London: Lawrence and Wishart.
Hajer, M. (1995). The Politics of Environmental Discourse: Ecological Modernization and the Policy Process. Oxford: Clarendon Press Oxford. http:// dx.doi.org/10.1093/019829333X.001.0001.
Hall, K., F. Cleaver, T. Fanks, and F. Maganga. (2014). Capturing critical institutionalism: a synthesis of key themes and debates. European Journal of Development Research 26(1):71-86. http://dx.doi.org/10.1057/ejdr.2013.48
Hall, P. A., & Taylor, R. C. R. (1996). Political Science and the Three New Institutionalisms. Political Studies, 44(5), 936–957. doi:10.1111/j.1467-9248.1996.tb00343.x
Harvey, D. (2003). The new imperialism. Oxford: Oxford University Press.
Hay, C. (2002). Political Analysis: A Critical Introduction. Hampshire: Palgrave Macmillan.
Hobbes, T. (2010 [1651]). Leviathan: Or the Matter, Forme, and Power of a Common-Wealth Ecclesiasticall and Civill. Yale: Yale University Press.
Jessop, B. (2005). Critical Realism and the Strategic-Relational Approach. New Formations: A Journal of Culture, Theory and Politics, 56, 40–5
Kashwan, P. (2016). Integrating power in institutional analysis: A micro-foundation perspective. Journal of Theoretical Politics, 28(1), 5–26. doi:10.1177/0951629815586877
Kashwan, P., MacLean, L. M., & García-López, G. A. (2019). Rethinking power and institutions in the shadows of neoliberalism. World Development, 120: 133-146. doi:10.1016/j.worlddev.2018.05.026
Kolinjivadi, V., Van Hecken, G., Almeida, D. V., Dupras, J., & Kosoy, N. (2017). Neoliberal performatives and the "making" of Payments for Ecosystem Services (PES). Progress in Human Geography, 030913251773570. doi:10.1177/0309132517735707
Latour, B. (1993). We Have Never Been Modern. Translated by Porter, Catherine. Harvard University Press.
Long, N. (2001). Development Sociology: Actor Perspectives, Routledge, Taylor & Francis, London /New York
Lorenz, S. (2017). Theories of power, in Spash, C.L., (Ed), Routledge Handbook of Ecological Economics: Nature and Society, 141-151, London: Routledge.
Lukes, S. (2005 [1974]). Power: A Radical View. Second Edition. London: Palgrave, 2005. ISBN: 0-333-42092-6.

Machiavelli, N. (1998 [1532]). The Prince. Chicago: University of Chicago Press.
Marshall, G.R. and Alexandra, J. (2016). Institutional path dependence and environmental water recovery in Australia's Murray-Darling Basin. Water Alternatives 9(3): 679-703
Miller, C. (2000). The Dynamics of Framing Environmental Values and Policy: Four Models of Societal Processes. Environmental Values,. 9 (2): 211-233.
Mitchell, T. (2011). Carbon Democracy: Political power in the age of oil. Verso Books.
Morrison, T. H., Adger, W. N., Brown, K., Lemos, M. C., Huitema, D., Phelps, J., Evans, L., Cohen, P., Song, A.M., Turner, R., Quinn, T., Hughes, T. P. (2019). The black box of power in polycentric environmental governance. Global Environmental Change, 57, 101934. doi:10.1016/j.gloenvcha.2019.101934
Ostrom, Elinor. (1990) Governing the Commons: The Evolution of Institutions for Collective Action. New York: Cambridge University.
Ostrom, E. (2005). Understanding Institutional Diversity. Princeton, NJ: Princeton University Press..
Perrault T., G. Bridge and J. McCarthy (eds.). (2015). The Routledge handbook of political ecology. London: Routledge.
Radkau, J. (2013). Nature and Power: An Intimate and Ambiguous Connection. Social Science History, 37(3), 325-345. https://doi.org/10.1215/01455532-2209402
Raik, D., Wilson, A., & Decker, D. (2008). Power in Natural Resources Management: An Application of Theory. Society and Natural Resources, 21, 729–739.
Rose, N. (2004). Powers of Freedom: Reframing Political Thought. 335.
Rose, N. (1993). Government, authority and expertise in advanced liberalism. Economy and Society, 22(3), 283–299. https://doi.org/10.1080/03085149300000019
Rose N., O'Malley P. and Valverde M. (2006). Governmentality. Annual Review of Law and Social Science 2(1): 83–104. DOI: 10.1146/annurev.lawsocsci.2.081805.105900.
Svarstad, H., Benjaminsen, A., Overa, R. (2018) Power theories in political ecology. Journal of Political Ecology. Vol. 25.
Theesfeld, I. (2009). The downgrading effects of abuse of power on trust and collective action in Bulgaria's irrigation sector. In V. Beckmann & M. Padmanabhan (Eds.), Institutions and sustainability: Political economy of agriculture and environment (pp. 223–242). Heidelberg, Berlin: Springer.
Todd, Z. (2016). An Indigenous Feminist's Take On The Ontological Turn: ›Ontology‹ Is Just Another Word For Colonialism. Journal of Historical Sociology 29, 1, 4–22.
Vatn, A. (2005). Rationality, institutions and environmental policy. Ecological Economics, 55 (2): 203-217
Vatn, A. (2017). Critical institutional economics, in Spash, C.L., (Ed), Routledge Handbook of Ecological Economics: Nature and Society, 29-38, London: Routledge.
Weber, M. (1964 [1947]). The theory of social and economic organization. New York: Free Press.

Annex 2.2 Analysis of national and international policy documents related to biodiversity and sustainability

This annex presents a synthesis of the results of the review on national and international policy documents, which had per objective to provide insights into how different environmental and development policies relate to the concepts assessed in *Chapter 2*. Selected documents in this review include:

- The eight summaries-for-policymakers that have been approved in IPBES plenaries up until December 2020.
- Documents associated with the Aichi Targets (CBD 2013) and the draft document of the targets of the post-2020 global biodiversity framework (CBD 2020).
- Sixteen national biodiversity strategies and action plans (NBSAPs).
- Two documents related to the 2030 Agenda for Sustainability and the Sustainable Development Goals (SDGs) (United Nations 2015, 2020).
- Five Food and Agriculture Organization (FAO) reports (FAO 2011, 2018a, 2018b, 2018c, 2019).
- The millennium ecosystem assessment synthesis (2005)
- The interim report of the Dasgupta review (2020)
- The economics of ecosystems and biodiversity (synthesis) (2010)
- The living planet report (2018).
- The European Union's 2030 biodiversity strategy (European Commission, 2020)
- The Latin American and Caribbean Escazú agreement (United Nations, 2018).

Further information on the criteria used to select these documents, as well as details of the coding process and analysis, can be found in the data management report of this review[4].

[4] Analysis of national and international policy documents related to biodiversity and sustainability (https://doi.org/10.5281/zenodo.4399907)

Table SM2.2 Summary of results

Concept	Salient definitions & relevant associations
Value concepts (include ecosystem services and whether it is plural, monistic, etc.)	IPBES: In keeping with the platform's conceptual framework (Diaz et al. 2015), IPBES documents make strong and explicit references to the concepts of both 'Nature's Contributions to People' (NCP) and ecosystem services, highlighting predominantly instrumental values and their relation to material NCP and provisional ES. A plural conceptualization and measurement of values is found throughout, such as through the recognition of a range of different approaches to valuing a 'good life'. These documents also express values plurality related to how and by whom NCP are valued, being "highly dependent on place, time and culture, with different societies espousing different views of their relationships with nature and placing different levels of importance on collective versus individual rights, the material versus the spiritual domain, intrinsic versus instrumental values, and the present time versus the past or the future" (IPBES 2019, p. 40). Nevertheless, explanations of how such plural approaches to valuation might be integrated into decision-making are rarely explicit. There are occasional reference like "participatory deliberative processes contribute to a large class of problem-solving situations and can support effective governance, because they allow multiple and sometimes conflicting values to be considered at the local scale" (IPBES 2018 - Americas SPM, p. 31).
	CBD: The CBD-level documents broadly establish a framework for both conserving and sustainably using nature, focused on biodiversity. Both the Aichi Targets and the zero order draft of the post-2020 global biodiversity framework acknowledge that there are multiple values of biodiversity, based on diverse societies and management practices, that can be assessed in different ways that require multiple disciplinary approaches. Particularly for the zero order draft of the post-2020 global biodiversity framework 'nature's contributions to people' are an important part implied in its mission. As part of the CBD-process, NBSAPs from both the Global North and South reflect some level of plurality regarding nature's values. However, values were mostly recognized implicitly, and explicit treatment of values typologies was infrequent. Notable exceptions were found in both regions (e.g., Greece: "An alternative approach is possible; an approach that is not limited to utilitarian valuation and that recognizes the multiple values of nature, such as ecological, religious and aesthetic components", p. 84; Indonesia: "According to Laverty et al (2003), biodiversity has two significant values: (i) the intrinsic value (inherent value) and (ii) extrinsic value (benefit value or instrumental value)", p. 97). In both the North and South, NBSAPs display primarily an anthropocentric perspective with only brief mention of other moral orientations. Ecosystem goods and services were evoked often in reference to satisfying human needs, such as food security. Also, in line with CBD goals, almost all NBSAPs in both the North and South included some reference to ILK; however, actions, indicators and valuation methods were mostly focused on biophysical and economic values.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: The MA recognizes the plural values of nature, while TEEB and Dasgupta are explicitly economic approaches and Living Planet mostly displays a biophysical understanding of valuing the environment. Sustainable Development: Neither the SDGs nor the 2030 Agenda for Sustainability explicitly discussed values of nature concepts. Regional Environmental Agreements: The Escazú Agreement does not address value *per se*, but does heavily emphasize participation and justice. It does not question the human-nature relationship or nature itself, but does recognize some of the issues of human diversity (views and knowledge) and barriers to ABS. The EU 2030 Strategy is focused on the protection of biodiversity based on its importance for sustaining human well-being both at the individual and social scales. Although valuation of nature is not something that is explicitly mentioned, a series of claims throughout the text show that the approach for calculating the value of nature is monistic and monetary, given that both the received ecosystem services and their loss is measured in Euros. FAO: These reports make reference to ES, but as a 'sectoral' domain they generally assume a single disciplinary approach to value. There are suggestions regarding a broader understanding of values, such as FAO (2018) recognizing the value of fishing for

	communities' identities. However, such references to more plural values and valuation generally lack focus or specificity in relation to policy instruments and governance.
Negative values of nature (nature negatively affecting humans, not humans negatively affecting nature?)	IPBES: The IPBES documents refer mainly to the negative values of nature in terms of regulation of natural hazards, as an NCP, or the effect of such events on other NCP. The most common examples include flooding, drought, invasive species and disease outbreaks.
	CBD & NBSAPs: While the CBD-level documents did not explicitly mention negative values associated with nature itself, both in the North and South some NBSAPs recognized the negative effects of natural hazards (e.g., Japan - earthquakes, Australia - bushfires, Korea - red tide, Brazil - landslides). There we also frequent references to the negative effects of humans on the environment throughout all NBSAPs (e.g., contamination).
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: General recognition of the negative effects of natural disasters, exacerbated by climate change. Regional: The EU document refers to pandemics, such as COVID, without explicit reference to the role of nature. Sustainable Development: These documents recognize the negative social and economic impacts of natural disasters, including pandemics, earthquakes, extreme climate events, and environmental degradation, such as desertification, drought, wildlife trafficking and biodiversity loss. FAO: As with other documents, negative impacts of nature are associated with natural hazards and emergencies with a distinction between sudden (e.g., earthquakes, storms, flooding, locusts etc.) and slow emergencies (e.g., invasive species, droughts). Not explicitly referred to as 'negative values', but rather language of hazards and risks.
Intrinsic values (explicit, implicit, no mention)	IPBES: Intrinsic values were not considered in most IPBES documents. In one instance, it was mentioned was in opposition to instrumental values (IPBES Pollination, 2016) and in another it was implied in the notion of 'rights of Mother Earth' (IPBES Land Degradation, 2018)
	CBD & NBSAPs: At the CBD-level, intrinsic values were mentioned in the Aichi Targets, and in the mission of the Framework for the zero order draft of the post-2020 global biodiversity framework. In the Global North and South, the majority of NBSAPs made explicit reference to intrinsic values. Many that do not use the term still place importance or moral consideration on biodiversity or highlight the need to protect natural heritage, undisturbed ecosystems and pristine wilderness. However, intrinsic value was used as a justification for conservation, rather than being linked to policy instruments. A minority of NBSAPs make no reference to intrinsic values.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: While TEEB and the Dasgupta reports do not mention intrinsic value, the MA states concern for ecosystems and species well-being due to their intrinsic value and provides a definition (p. V). Living Planet report does make a case for the protection of nature for intrinsic values, as well as scientific, spiritual and aesthetic reasons, but intrinsic value as a concept is not developed. Regional: No mention. Sustainable Development: There was no explicit mention of intrinsic values in the context of sustainable development. FAO: These documents make no reference to intrinsic values either implicitly or explicitly other than briefly referring to rights of Mother Earth when focusing on the philosophy of Bolivia in one case study in the report on the state of the World's Forests (2018).
Instrumental values (explicit, implicit, no mention)	IPBES: Instrumental values are referred to implicitly in all IPBES documents, pointing out the need to understand the ways in which nature is important for human survival and as underpinning economies through material NCP (or provisioning ES). Only one explicit reference (SPM for Europe-Central Asia) defined instrumental value ("value attributed to something as a means to achieve a particular end", p. 15).

	CBD & NBSAPs: There were few explicit references to the term instrumental value, but all CBD documents implicitly used instrumental concepts, often in the language of ecosystem goods and services that support economic activities, provide food, secure living conditions and human health. For example, Canada refers to biodiversity as a 'natural insurance policy' and Japan refers to biodiversity having "useful value for humans, which contributes to a good life at the present time and in the future" (p. 15). Likewise, Brazil highlights "the potential of production chains that use biodiversity products to reduce poverty and improve the quality of life of local communities" (p. 26).
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: Instrumental values are implied in such concepts as direct-use values, non-consumptive use values and indirect use values (TEEB, MA) or by framing ecosystems as assets or natural capital whose value is determined by the goods and services they provide (Dasgupta, MA). Living Planet report made only implicit references to instrumental values via provisioning and regulating ES. Sustainable Development: There are implicit references to instrumental values regarding social and economic development from natural resources and sustainable use of terrestrial and aquatic ecosystems. Regional Environmental Agreements: While the Escazú Agreement makes no mention of instrumental values, the EU Strategy implies such a relationship via concepts by framing biodiversity conservation in the context of providing essential elements for human wellbeing. FAO: Sectoral documents adopted a very narrow instrumental view of values overall, and they also made implicit references to this concept of value through explaining significance of provisioning ES and the material contributions to economic systems and economic growth (e.g., fish stock valued through contribution to global trade value chains and human consumption alone).
Relational values (explicit, implicit, no mention)	IPBES: All IPBES documents make implicit reference to relational values (e.g., the importance of diverse human-nature relationships), but only one (Europe-Central Asia SPM) gave an explicit definition ("positive values assigned to desirable relationships, such as those among people and between people and nature" p. 15). Implicit concepts included cultural heritage, identities and practices, and ILK perspectives on relationships to land and cultural landscapes (e.g., cultural significance of pollinators, Pollination SPM).
	CBD & NBSAPs: In the CBD-domain, relational values are not explicit in Aichi or the zero order draft of the targets of the post-2020 global biodiversity framework, but they are implicit in notions of the role of biodiversity in culture, spiritual practices and worldviews and the 2050 vision of living in harmony with nature. These relational values are often found in the language of cultural ES in the NBSAPs of both the Global North and South (e.g., Japan's integration of the concept of *fudo*, referring to "local characteristics created through the integration of local natural features, climate and culture" (p. 13), or Guatemala's vision of a multicultural population that values nature).
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: The MA, TEEB, Dasgupta Review and Living Planet report do not mention relational values explicitly, but they all recognize them in spiritual and cultural ecosystem services. Sustainable Development: While the Sustainable Development Goals Report 2020 does not refer implicit or explicitly to relational values, the Transforming our world: the 2030 Agenda for Sustainable Development implies them in their vision about "living in harmony with nature". Regional Environmental Agreements: Escazú does not mention relational values, but the EU 2030 Strategy considers biodiversity to be essential for human physical and mental well-being. FAO: Relational values were not mentioned explicitly, though they were referred to implicitly through various recognitions of importance of valuing people's relationships with nature as opposed to simply economic contributions as well as references to cultural ES and cultural heritage of places.

Policy instruments (informational, cooperative, economic, regulatory)	IPBES: SPMs presented a mix of policy recommendations. informational instruments were mostly related to education and awareness raising of ES and NCP, as well as promoting behavioral change. Regulatory policy suggestions included laws to promote equal and fair access to resources or ensure protection of key ecological areas. Cooperative arrangements sought to bring public and private sectors together and work towards more sustainable outcomes.
	CBD & NBSAPs: The broad CBD documents display a diversity of policy instruments. These documents largely discuss informational and provide guidelines, including regulatory instruments for implementation. Actions laid out also include cooperation and financing. Similarly, national level documents are also broad and diverse regarding the policy instruments they incorporate, but informational policy (education, awareness raising) is uniform throughout. Regulatory and administrative issues are also common. Some countries in both the North and South also make specific reference to economic instruments and incentive-based subsidies (e.g., Finland, Korea and Indonesia).
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: The coded documents focus on informational instruments. The Living Planet report is meant to raise awareness and understanding of the importance of nature and ecosystem services, while MA, TEEB and the Dasgupta Review are meant to provide data to policy-makers. Sustainable Development: The 2030 Agenda for sustainable development has a regulatory character, aiming to present an action plan for ending face different challenges faced by humanity. The SDGs Report 2020 is an informative document that presents information on the progress made by the countries towards meeting those goals by 2030. Regional Environmental Agreements: As regional agreements, both the EU Strategy and Escazú promote cooperation. While Escazú is a LAC regional and South-South cooperative agreement, the EU Strategy also considers North-South funding relationships. Escazú is explicitly about enhancing information and participation, which requires regulatory policies. The EU Strategy mentions various programmes to enhance 'sustainable' practices, but also requires international agreements and national laws for successful outcomes of this strategy. FAO: The FAO documents mainly focus on economic instruments, looking at incentives for minimizing harmful practices, or subsidies to promote beneficial practices (e.g. 'climate-smart subsidies'). Also focus on regulatory instruments that secure tenure/access to land or eliminating laws that discriminate (e.g., gender equality).
Value indicators expressed in instruments, actions or targets (biophysical, economic, socio-cultural, health, ILK)	IPBES: IPBES Summary documents demonstrated a range of value indicators biophysical/ecological (species inventories, recording genetic diversity etc., economic, or monetary indicators in accounting for ecosystem services), and socio-cultural (such as measures of the quality of education/awareness raising in regards to biodiversity).
	CBD & NBSAPs: The documents related to Aichi Targets and the zero order draft of the post-2020 global biodiversity framework included a suite of indicators, including economic, social and health, but biophysical measures predominated. Likewise, in both the Global North and South, NBSAPs had a full range of value indicators, but were focused on biophysical measures (e.g., species inventories). There were also universal calls to implement socio-cultural measures of education. Plus, many actions are oriented towards measuring administrative performance of the strategies and agencies per se (e.g., indicators of policy compliance). Economic indicators were also frequently cited (e.g., Finland's aim to develop macroeconomic indicators as a way of giving due consideration to the state of the country's biodiversity as well as identifying economic incentives with harmful impacts to be removed; Afghanistan's focus on funding sources to finance the biodiversity action plans). ILK is also recognized in many national policies, such as creating databases and ensuring participation of marginal sectors.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: MA, TEEB and the Dasgupta review consider biophysical and economic indicators (particularly, monetary indicators). The MA also includes socio-cultural indicators and TEEB, socio-political ones. The Living Planet Report expresses a wider, more diverse range of value indicators, from biophysical indicators in relation to the Living Planet Index as well as economic, monetary value indicators in relation to ecosystem services. Both of these value indicators were used

	and expressed by way of increasing awareness and understanding of the significance of biodiversity. Sustainable Development: The2030 Agenda for Sustainable Development does not present indicators but the 2020 Report on the achievement of the SDGs includes a series of health-related, social, cultural, biophysical and economic indicators through which the information on the advancement towards achieving the reports is synthesized. Regional Environmental Agreements: Escazú makes no mention of values indicators. The EU Strategy highlights biophysical and economic indicators, particularly benefits provided by biodiversity as well as those derived in monetary terms from its protection (e.g., well-being, economic growth). FAO: The FAO documents predominantly expressed monetary value indicators and the occasional reference to biophysical indicators were only in relation to these economic, monetary indicators.
Valuation expressed in instruments, actions or targets (aggregation methods, plurality or not)	IPBES: SPMs suggested a plural approach to values, with careful attention to how these values might be aggregated or integrated into decision-making. For instance, Asia Pacific SPM discusses the need to be cautious when transferring the economic values of NCP outside of the original valuation contexts. Similarly, the Americas SPM points out the problem of incommensurability of values and how participatory and deliberative methods can resolve value conflicts and tensions at the local scales. Other IPBES SPMs make reference to holistic valuation processes that incorporate and maximise the mix of economic, socio-cultural values into decision making.
	CBD & NBSAPs: The CBD-level documents recognize the need for plural valuation methods (e.g., Aichi Target 2 "Efforts to improve the valuation of biodiversity should include tools and methods that recognize social and cultural values, in addition to economic values, and should be conducted in ways that encourage the sustainable use of biodiversity at all levels. The evaluation and integration of biodiversity can be costly and time-consuming depending on national circumstances"). However, these types of methods are not fully developed and mostly appear as 'to be developed' in the zero order draft of the post-2020 global biodiversity framework. At the national-level, no NBSAPs make explicit the methods of aggregation or integration, but there was much nominal recognition of plurality and the need to prioritise multiple values of biodiversity into decision-making. However, there is little explanation of how this might be done.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: These reports are valuations in themselves with a particular emphasis on environmental/ecological economic and biophysical methods. While the MA recognized that the multiple services that ecosystems provide cannot be separated, and thus assessed six types of cultural services valued by humans are described (p. 120), TEEB talks explicitly about monetary and bipophysical valuation and says that both fail to reflect the plurality of values, particularly those related to culture. Finally, the Dasgupta review explains that the social value of an asset represents its value to society as a whole, and that this value is called 'accounting price' which is not necessarily the same as its market price; in this sense, many ecosystem services do not have market prices and are free goods. There is no explicit reference to valuation processes or approaches in the Living Planet report. Sustainable Development: No mention. Regional Environmental Agreements: No mention. FAO: These reports largely took value to be aggregations of preferences, summed by the *State of Food and Agriculture* (2019), as the "rational decisions that actors make to allow them to maximise their profits" (p. 50), yet made little mention elsewhere of how these values might best be integrated into decision-making.
Worldview orientations (anthro-, bio-, eco-centric or mix and level of mix)	IPBES: Summaries predominantly express an anthropocentric worldview with main perspectives being that nature ought to be protected owing to the benefits and necessities it provides humans. However, references to pluricentric worldviews were occasionally made; for example the Pollination (2016) SPM points out the significance of biodiversity for the range of cultural and spiritual values that focus on the long standing relationships between bees and communities of people, pointing to a more pluricentric relational worldview,

	however this is only briefly mentioned in the document and the majority focuses on the benefits that pollinators such as bees provides humans.
	CBD & NBSAPs: The CBD-level documents take a particularly anthropocentric stance, by recognizing the role of biodiversity for human well-being, but in the zero order draft of the post-2020 global biodiversity framework there are also calls to sustain planetary processes for themselves, which could be classified as an ecocentric perspective. Similarly, all NBSAPs are largely anthropocentric (e.g., Afghanistan's need to use nature to develop the country sustainably post-conflict), but many could be interpreted as ranging from 'weak anthropocentrism' (e.g., Japan and Australia often made explicit references to the way in which humans were just one part of, or embedded within a larger system of species that existed before and will do afterwards, and thus all living beings depend on these same ecosystems that we do). Similarly, some countries conceived the human-nature relationship more integrally (e.g., Zimbabwe's emphasis on agrobiodiversity). While these examples imply some level of ecocentric or biocentric worldviews, the overlying theme of the documents was to make the case to protect biodiversity due to the benefits it provides humans and thus reflected more of a weakly anthropocentric worldview.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: Living Planet report varies from strong to weak anthropocentrism. TEEB and Dasgupta are also anthropocentric as both consider Nature as a provider for humans. The MA has an ecocentric orientation in that it recognizes humans as part of ecosystems and ecosystem services are a product of their interactions. Sustainable Development: an anthropocentric worldview, where nature is an indispensable element for the social and economic development of present and future human generations, underpins these documents. Regional Environmental Agreements: These concepts are not reflected in Escazú, but the EU Strategy clearly seeks sustainable management of biodiversity for human well-being, classifying it within the anthropocentric realm. FAO: FAO documents express strong anthropocentric worldviews in their justification of looking after nature for the economic contributions it provides humans.
Knowledge systems (including dominance and gaps)	IPBES: As a 'science-policy' platform, the IPBES documents predominantly reflect scientific/technical knowledge, despite frequent references to ILK perspectives and the need for participatory and inclusive local governance based on diverse knowledge systems. Aside from a lack of specific data to gather understandings of links between drivers, NCP and quality of life, there were also references to the lack of explicit understandings about the contributions of ILK perspectives to understanding NCP.
	CBD & NBSAPs: The CBD-level documents rely on scientific/technical knowledge, while also placing ILK in a prominent place (e.g., the zero order draft of the post-2020 global biodiversity framework relates ILK and conservation of genetic diversity). Indicators are drawn from social, economic, political, biophysical and cultural variables. There are two knowledge gaps identified in the Aichi Targets: level of biodiversity awareness at the national level and definition of key stakeholders to involve for effective biodiversity conservation at the national level. National-level documents too were focused on scientific/technical knowledge, despite occasional references to alternative knowledge systems. For example, Japan's NBSAP recognizes and appreciates local practices that are based on traditional ecological knowledge, yet shows little evidence of integrating such knowledge systems into decision-making Korea's NBSAP mentions the knowledge gap of understanding what 'traditional knowledge' actually means. Other documents make little mention of alternative ways of knowing and point to technical information gaps in taxonomy (Ireland) and sufficient data around marine and coastal ecology (Australia, Turkey). Similarly, in the Global South, the predominant knowledge system was scientific/technical, and when explicitly identified gaps were mostly technical (i.e., 'capacity building'). At the same time, it was frequent that documents recognized explicitly ILK or implicitly via the recognition of diverse communities or the need for participation.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: These documents rely heavily on scientific/technical knowledge.

	Sustainable Development: These documents are based on scientific/technical information, but many countries are lacking baseline data on some targets. Therefore, knowledge gaps are mostly oriented towards resolving these technical issues. Regional Environmental Agreements: Escazú seeks to promote participation and inclusion as principles of environmental information, which inherently involves diverse knowledge systems, but there is no specific treatment of this subject. The EU Strategy is based on scientific/technical knowledge and while it acknowledges ILK does not make explicit how this information is integrated. FAO: These reports are rooted within a scientific/technical knowledge system, and knowledge gaps often revolve around identifying a lack of technical issues (e.g., definitions of food 'waste', what constitutes 'local', or terms related to the carbon footprint).
Environmental conflicts	IPBES: Most explicit references are made in Diaz et al., (2018) Global SPM, i.e., mentions the 'more than 2,500 conflicts over fossil fuels, water, food and land are currently occurring across the planet, and at least 1,000 environmental activists and journalists were killed between 2002 and 2013' (pg. 20), as well as conflicts resulting from colonial expansionism into indigenous territories. Includes other references to conflict, i.e., conflict in Balkans in Europe Central Asia SPM. Similarly land disputes are referred to as well as conflict in uses of natural resources and impact of loss of NCP on causing or being caused by conflicts.
	CBD & NBSAPs: While the Aichi Targets do not mention conflicts, Action 7 in the zero order draft of the post-2020 global biodiversity framework calls for reducing human-wildlife conflicts. In the Global North, most references to conflict in the NBSAPs related to people in conflict with nature and contributing to biodiversity loss or natural disasters (e.g., Japan), while Turkey also evoked the conflicts around biopiracy. In the Global South, NBSAPs frequently recognize the need to mitigate conflicts between users (e.g., watershed management in Zimbabwe) and sectors (e.g., agricultural versus extractive industries in Indonesia). There was also mention of the need to resolve problems associated with conflicts that arise due to contamination that affects human health in Brazil, as well as the need to resolve political and military conflicts that affect natural resources in Afghanistan.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: Only the MA addresses this topic, presenting them as a result of the contested use of resources, and providing examples of the implementation of PES programs, degradation of ecosystems and damage in Indigenous Peoples territories. Sustainable Development: Armed conflicts are among the challenges faced by human kind, however, there is no reference to environmental conflicts. Regional Environmental Agreements: The Escazú agreement states it can be "a powerful instrument to prevent conflict, achieve informed, participatory and inclusive decision-making and deepen accountability, transparency and good governance." The EU Strategy makes no mention of conflict. FAO: FAO make little explicit mention of conflicts other than as a contributing factor to weakening food security. Elsewhere, State of World Forests (2018) report makes a reference to the value of forest products in Uganda in post-conflict reconstruction, for those escaping violent conflict.
Relationship to justice (*distributive*: ABS; *recognitional*: epistemic; *procedural*: governance and rule of law)	IPBES: Summaries mainly refer to recognitional justice in acknowledging the need to include ILK in decision-making and governance as well as recognizing the right to self-determination and cultural continuity of communities and identities.
	CBD & NBSAPs: At the CBD-level, all levels of justice are incorporated in a rights-based approach. For example, recognition of diverse perspectives and peoples is sought in Aichi Targets 3 and 4, which require identification and involvement of stakeholders, and the zero order draft of the post-2020 global biodiversity framework explicitly seeks goals like gender equity, women's empowerment and effective participation of IPLCs. Distribution of costs and benefits of nature is part of fair and equitable access and benefits sharing (ABS) resulting from the utilization of genetic resources and traditional knowledge. Procedures are also highlighted by the rules and regulations of achieving these other aspects of justice, including the NBSAPs themselves.

	At the national level, NBSAPs almost uniformly reflected the CBD's ABS theme, but also recognitional issues were brought to light regarding marginalized groups (e.g., Aborigines in Australia, Sami in Finland, women in India, knowledge holders of agrobiodiversity in Malawi). Plus, Afghanistan explicitly called for a focus on procedural issues, surrounding the need for creating the rules of law and regulatory framework for biodiversity conservation.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: The MA does not mention 'justice' but it talks about inequality, particularly income inequality and poverty reduction. TEEB makes reference to both distributive and procedural justice issues and the Dasgupta Review talks about intergenerational justice. There were no clear mentions of 'justice' in the Living Planet report though there is a brief implicit reference to recognitional justice in acknowledging the multiple knowledge systems through IPBES NCP framework. Sustainable Development: The 2030 Agenda refers to inter and intragenerational justice, and Target 16 of the SDGs mentions justice in the context of incarceration and trials, but not explicitly related to nature or biodiversity, the services provided or their values. Regional Environmental Agreements: Escazú conceives justice as a right, subject to due process (i.e., procedural justice). The EU 2030 Strategy states that the benefits of biodiversity protection and recovery should be enjoyed by everyone (distributive justice), and it promotes the participation of different groups in impact assessments (procedural justice). FAO: There is a focus on distributive justice, pointing out unequal resource consumption around the world and linking in policies to SDGs such as eradicating poverty alongside tackling issued such as food waste. Also references to procedural justice in recognizing uneven power relations and rule of law not supporting certain groups. Also gender equality was referred to as part of this procedural justice as certain laws and regulations prevented women from gaining equal say in decision-making and access to land tenure, a key theme FAO Women in Agriculture (2011) document.
Attention to local cultural norms	IPBES: All IPBES documents referred to the importance of sensitivity to local and cultural norms in decision-making, e.g., Europe/Central Asia summary, 'involvement can be strengthened by careful monitoring and evaluation, taking various values into consideration, including those of indigenous peoples and local communities.' (pg.13)
	CBD & NBSAPs: Throughout the CBD-level documents, there is sensitivity to local cultural norms either implicitly (e.g., Aichi Targets apply some social indicators, and the zero order draft of the post-2020 global biodiversity framework implicitly considers it via including IPLC in decision-making processes). NBSAPs too generally show attention to local cultural norms in both the Global North and South via recognition of IPLC values, practices, traditions and knowledge in decision-making, though this is not always explicit. For example, Japan highlights significance of local traditional concept of *fudo*, defined as 'milieu' or 'local characteristics' which is all about place-based, local biocultural diversity. India recognizes the "roles and responsibilities of local communities, traditional forest dwellers, women and the other vulnerable groups in conservation and sustainable use of resources (p. 78). Zimbabwe too "recognizes that humans with their cultural diversity are an integral component of ecosystems" and acknowledges the need to not only incorporate cultural values, but also norms and practices like taboos and traditional authorities.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: MEA calls for the inclusion of indigenous peoples' traditional practices in decisions regarding management, as well as respect to their rights. TEEB states that the implementation of monetary valuation of biodiversity and ES needs to be accepted to not clash with cultural norms and be counterproductive. The Living Planet report makes no reference to attending to local cultural norms, yet there are snapshots of personal accounts and experiences throughout the report, such as reference to 'Jaladuddin the storyteller' (2018, pg. 75) as an example of important forms of knowledge exchange. Sustainable Development: While there is no explicit mention to local or cultural norms, The 2030 Agenda states that the obstacles to the effective exercise of self-determination rights should be removed. Regional Environmental Agreements: Escazú calls upon the parties to "promote regard for local knowledge, dialogue and interaction of different views and knowledge, where appropriate." Norms are also indirectly considered in the way the agreement proposes to achieve participation. While the agreement mostly discusses 'public' participation, it also

	mentions establishing appropriate conditions for participation based on social, economic, cultural, geographic, gender and language, accounting for local knowledge and different views and respecting rights of IPLC. In the EU 2030 Strategy there is no explicit reference to local or cultural norms, but it explains that there will be processes of consultation to generate impact assessments about the initiatives proposed. However, no mention is made as to who will be part of those consultations and if the processes would be adapted to either local or cultural norms. FAO: FAO documents make few explicit references to local or cultural norms, only brief occasional references are made implicitly, i.e., State to Agricultural Commodity Markets (2018) points out possible impact of global trade networks on more localized trade networks and markets.
Level of participation in the creation of the document itself	IPBES: The IPBES documents are produced as a result of contributions from the collaboration of global experts with a review process usually emanating from an initial workshop.
	CBD & NBSAPs: CBA-level documents involve the stakeholders involved in these multi-lateral processes, but the national level documents are more diverse. In all cases, their development was lead by relevant governmental departments or agencies (e.g., Ministries of Environment), but most also involved some level of participation either within the government or including external consultation, review and workshops with universities and research institutions, civil society and the private sector.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: All these documents were developed by expert groups from various countries, mostly from academic and research institutions. Sustainable Development: The development of these documents was led by the UN General Assembly (2030 Agenda), the UN Secretary and ECOSOC (Report on the SDGs). Heads of State and Government Representatives accompanied the process or provided information for developing the Report on the SDGs. For the 2030 Agendas there was a public consultation and engagement with civil society and other stakeholders prior to the creation of the document. Regional Environmental Agreements: Escazú is the first multilateral agreement carried out by UN's Economic Commission for Latin America and the Caribbean and its 33 member countries. The EU 2030 Strategy was developed and signed by the EU-member states. FAO: The FAO documents comment on the methodology of the report which consists of technical global experts and a 'rigorous' review process.
Level of participation in the actions proposed by the document	IPBES: SPMs all point out the importance of broadening participation in the actions (policy instruments and governance structures) that are mentioned, acknowledging that opening up spaces for participation can lead to better decision outcomes. However certain IPBES documents, i.e., the Scenarios and Modelling SPM refers to the technical expertise required to understand and apply such approaches to decision-making, which may work to exclude participants.
	CBD & NBSAPs: Participation implied in CBD-level documents is directed toward CBD-member states and the need to involve multiple government agencies in the implementation (e.g., multiple ministries, national-regional-local jurisdictions). The the zero order draft of the post-2020 global biodiversity framework calls on governments and societies "to determine priorities and allocate financial and other resources, internalize the value of nature and recognize the cost of inaction." It recognizes particularly women, youth, IPLCs, civil society, academia and scientific institutions, the private sector, and organizations at global, national and local levels. The NBSAPs all reflect this with calls for 'citizen' participation in decision-making (e.g., Australia explicitly set the goal in 2010 of increasing participation by 25% for all Australians and indigenous people in decision-making by 2015). In the Global South we also see calls for participation, including community-based conservation approaches, such as local councils that incorporate traditional practices and knowledge (e.g., Malawi). Several describe efforts to empower historically marginalized groups, by capacity-building for the participation and inclusion of women, youth and indigenous populations in the management instruments of protected areas (e.g., Brasil).

	Major Global Reports on Biodiversity, Ecosystem Services and Economics: These reports are targeted to inform policy-making, however, their audience is composed by different types of stakeholders. Nevertheless, since these are not policy documents per se, even when the MEA and TEEB call for inclusion of various actors and emphasize the benefits of this for management and decision-making, there are no concrete actions to implement and so, the level of participation cannot be specified. This is the case too with the Living Planet report, which though it recognises the importance of multiple knowledge systems, implying participation, there is no explicit reference to how this might be implemented. Sustainable Development: The implementation of the 2030 Agenda and the accomplishment of the targets of the SDGs are responsibility of all countries and require the participation of all stakeholders and all people. Regional Environmental Agreements: The Escazú agreement mostly discusses 'public' participation, but also mentions establishing appropriate conditions for participation based on social, economic, cultural, geographic, gender and language, accounting for local knowledge and different views and respecting rights of IPLC. The EU 2030 Strategy calls for collaboration between governments and the academic sector. It also recognizes the principle of equality found in the zero order draft of the post-2020 global biodiversity framework, targeted to achieve full respect for the rights and effective participation of IPLCs, as well as the participation of all stakeholders including women, youth, civil society, local authorities, private sector, academia and scientific institutions (although it does not say how). FAO: There is a strong focus on addressing the lack of participation of women in policymaking. Efforts to ensure the participation of women at all levels of environmental governance. This theme is evident in the State of World Forests (2018), Women in Agriculture (2011) and State of World Fisheries and Aquaculture (2018). Other FAO documents make no reference to participation.
Risks and uncertainties in catastrophes and natural disasters	IPBES: Several IPBES documents deal with risk through linking in to wider risk-based frameworks of natural disasters (e.g., Asia-Pacific SPM: Sendai Framework for Disaster Risk Reduction 2015–2030 or Americas SPM: EcoDRR: ecosystem-based disaster risk reduction).
	CBD & NBSAPs: The global CBD documents are built around reducing the risk and threats of anthropogenic drivers of biodiversity loss, and also explicitly recognize the need to mitigate and adapt to natural disasters via nature-based solutions. Aichi Targets include risks trends regarding pollution (target 8), invasive alien species (target 9), coral reef and fish extinction (target 10), species extinction risk (target 12) and particularly of species that provide ecosystem services (target 14), among others, are presented as indicators for measuring the success of implemented actions. The the zero order draft of the post-2020 global biodiversity framework is built around a theory of change that considers the reduction of threats. To achieve this, 6 action targets are presented: (1) retain and restore freshwater, marine and terrestrial ecosystems; (2) protect sites of particular importance for biodiversity through protected areas and other effective area-based conservation measures; (3) reduce the rate of invasive alien species introduction and eliminate or reduce the impacts of those that are settled in priority sites; (4) reduce pollution from different sources; (5) achieve legal and sustainable levels of harvesting, trade and use of wild species; (6) contribute to climate change mitigation and adaptation and disaster risk reduction through nature-based solutions. These same themes are found at the national level with nuances based on local problems (e.g., wildfires in Australia, landslides in Brazil). Some countries also recognize the risks associated with genetic modifications and bio-safety (e.g., Turkey). In general, risk is also associated with the need for adaptive management to reduce environmental degradation (e.g., climate change) and using nature and biodiversity to mitigate natural disasters.
	Major Global Reports on Biodiversity, Ecosystem Services and Economics: These reports recognize the role of biodiversity and nature in managing risk and often use economic tools to consider alternative options in planning (e.g., Dasgupta compares to portfolio investment planning). Sustainable Development: In the context of sustainable development there is a general recognition that natural disasters require resolving environmental degradation and seeking nature-based solutions. For example, SDG13 aligns with the Sendai Framework, and the

	2030 Agenda reaffirms the outcomes of the 3rd UN Conference on Disaster Risk Reduction in the face of climate change. Regional Environmental Agreements: The EU Strategy mentions the cautionary principle to face hazards and explains that the protection of biodiversity reduces risks, particularly those regarding diseases and agricultural productivity. Escazú places emphasis on access to information, which would include risks. FAO: These documents refer to risk of catastrophic events in need for developing adaptive governance or planning (e.g., development of agricultural insurance or the role that forests can play in reducing risks).

References

Canada. (2016). *A biodiversity outcomes framework for Canada*.

CBD. (2013). *Quick Guides to the Aichi Biodiversity Targets* (pp. 1–42). https://www.cbd.int/doc/strategic-plan/targets/compilation-quick-guide-en.pdf

Department of Culture, Heritage and the Gaeltacht. (2017). *National biodiversity action plan 2017-2021*. Ireland.

Department of Sustainability Environment, Water, Population, and Communities. (2010). *Australian Government biodiversity policy consultation draft.* Department of Sustainability, Environment, Water, Population and Communities.

European Commission. (2020). *EU Biodiversity Strategy for 2030 Bringing Nature back into our lives Communication from the Commission to the European Parliament, the Council, the European Economic and Social Commitee and the Commitee of the Regions*. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/eu-biodiversity-strategy-2030_en

FAO (Ed.). (2011). *Women in agriculture: Closing the gender gap for development*. FAO.

FAO (Ed.). (2018a). *Agricultural trade, climate change and food security*. FAO.

FAO (Ed.). (2018b). *Forests pathways to sustainable development*. FAO.

FAO (Ed.). (2018c). *Meeting the sustainable development goals*.

Food and Agriculture Organization of the United Nations. (2019). *The state of food and agriculture 2019*.

Government of Malawi. (2015). *National biodiversity strategy and action plan II (2015-2025)*.

HM treasury. (2021). *Independent Review of Economics of Biodiversity*.

IPBES. (2016a). *Summary for policymakers of the assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production*. IPBES Secretariat.

IPBES. (2016b). *Summary for policymakers of the methodological assessment of scenarios and models of biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*.

IPBES. (2018a). *Summary for policymakers of the assessment report on land degradation and restoration of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES Secretariat. https://ipbes.net/sites/default/files/spm_3bi_ldr_digital.pdf

IPBES. (2018b). *Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for Africa of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES Secretariat. https://ipbes.net/sites/default/files/spm_africa_2018_digital.pdf

IPBES. (2018c). *Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for Asia and the Pacific of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES Secretariat. https://ipbes.net/sites/default/files/spm_asia-pacific_2018_digital.pdf

IPBES. (2018d). *Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for Europe and Central Asia of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*.

IPBES. (2018e). *Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for the Americas of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES Secretariat. www.ipbes.net

IPBES. (2019). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES Secretariat. 978-3-947851-13-3

Islamic Republic of Afghanistan. (2014). *National biodiversity strategy & action plan Framework for implementation 2014-2017*.

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

Ministry of Agriculture and Forestry, & General Directorate of Nature Conservation and National Parks. (2019). *National biodiversity action plan 2018-2028 NBSAP Addendum Action Plan*. Republic of Turkey.

Ministry of Education, Ministry of Science and ICT, Ministry of Foreign Affairs, Ministry of Culture, Sports and Tourism, Ministry of Agriculture, Food and Rural Affairs, Ministry of Trade, Industry and Energy, Ministry of Health and Welfare, Ministry of Environment, Ministry of Oceans and Fisheries, Rural Development Administration, & Korea Forest Service. (2018). *The Republic of Korea's fourth national biodiversity strategy 2019-2023*.

Ministry of Environment. (2012). *The National Biodiversity Strategy of Japan 2012-2020 Roadmap towards the Establishment of an Enriching Society in Harmony with Nature*. Japan.

Ministry of Environment, Energy & Climate Change (Ed.). (2014). *National Biodiversity Strategy & Action Plan*. Greece.

Ministry of Environment, Forest and Climate Change. (2019). *Implementation of India's National Biodiversity Action Plan An Overview* (p. 181). Government of India.

Ministry of environment, water and climate. (2014). *National Biodiversity Strategy and action plan 2014*. Republic of Zimbabwe.

Ministry of the Environment. (2012). *Government Resolution on the Strategy for the Conservation and Sustainable Use of Biodiversity in Finland for the years 2012–2020, 'Saving Nature for People.'* The Finnish Government.

Ministry of the Environment, Secretariat of Biodiversity. (2017). *National Biodiversity Strategy and Action Plan*. Federative Republic of Brazil.

Open-ended working group on the post-2020 global biodiversity framework. (2020). *Zero draft of the post-2020 global biodiversity framework*.

Republic of Indonesia. (2015). *Indonesian biodiversity strategy and action plan, 2015-2020*. Kementerian Perencanaan Pembangunan Nasional/Bappenas. https://www.cbd.int/reports/search/

Republic of Rwanda. (2016). *National biodiversity strategy and action plan* (p. 156). https://www.cbd.int/reports/search/

República de Guatemala. (2013). *Política nacional de diversidad biológica: Acuerdo gubernativo 220-2011 ; Estrategia nacional de diversidad biológica y su plan de acción 2012-2022 : Resolución 10-16-2012 del CONAP*. Consejo Nacional de Áreas Protegidas.

TEEB. (2010). *Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of TEEB*. UNEP.

United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development* (pp. 1–35). United Nations. https://www.refworld.org/docid/57b6e3e44.html [accessed 18 February 2019]

United Nations. (2018). *Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean* (LC/PUB.2018/8/-*; p. 40). United Nations. https://repositorio.cepal.org/bitstream/handle/11362/43583/1/S1800428_en.pdf

United Nations. (2020). *The Sustainable Development Goals Report 2020*.

WWF. (2018). *Living planet report*. WWF.

Annex 2.3 Religion in the context of values formation and change

Objective

This document outlines how scholarship on religion relates to processes of values formation/change at the scale of individuals, social groups and social-ecological interactions. This responds to the mandate of existing work in *section 2.5*.

Methodology

As religion is a ubiquitous feature of human societies and difficult itself to define (see below), the task of connecting religion to value formation/change is potentially as complex as reviewing value formation and change more generally. The recent review paper by Ives & Kidwell (2019) was used as a first stage of bringing together plural understandings of value with scholarship on religion in the context of environment and sustainability. The current review goes beyond this recent paper, by explicitly looking at value formation and change. In this review, religion will not be considered a discrete category to be 'added on' to scholarship on value formation and change. Rather, religion is understood as providing important colour and context for existing understandings of value formation and change.

Definitions

What do we mean by 'religion'? Max Weber famously refused to define religion in undertaking sociological analysis of it, arguing that one can only define it after it has been studied. Where definitions are attempted, there is a lack of consensus within the literature and definitions are regularly contested. One reason for this lack of unified definition is that "any attempt to define religion is an act of power, all definitions provoke counter-definitions" (Aldridge 2007, p. 17). Definitions are developed for a purpose: commonly to include or exclude certain individuals or groups from places of privilege or legitimacy within society.

Broadly speaking, definitions of religion can be considered inclusive or exclusive. Inclusive definitions are typically broad and focused on describing certain behaviours or functions, such as 'religion is a system of beliefs and practices by means of which a group of people struggles with the ultimate problems of human life' (Yinger 1970, p. 7). Inclusive definitions have been criticised for being applicable to such a wide range of social phenomena (e.g., football, political parties) that they lose their utility. Exclusive definitions are 'substantive, rather than functional, defining religion by what it is not by what it does' (Aldridge 2007, p. 36). Many of these explicitly refer to the existence of 'god' or supernatural deity. For example, 'an institution consisting of culturally patterned interaction with culturally postulated superhuman beings' (Spiro 1966, p. 96). Many exclusive definitions have been criticised for excluding socio-cultural expressions that may commonly be referred to as religious in nature. For example Shintoism – originating in Japan – does not have a concept of "god" as a superhuman being or beings, neither is there a central institutional authority in control of the movement.

Whether one adopts an exclusive or inclusive definition of religion is largely a function of one's 'philosophical anthropology': namely whether humans are considered innately religious (and therefore create 'religion' out of all manner of beliefs and practices), or whether religion is something that some humans adopt and others do not. Definitions of religion matter in the context of value formation and change, as they shape the ways by which values are considered to be embedded within or influenced by religion. In the context of religion and environmentalism, exclusive definitions of religion have led to the search for support for conservation within formalised, religious traditions and teachings (see for example work by the Alliance for Religions and Conservation, or the Parliament

of the World's Religions recent climate commitments project). More inclusive definitions (e.g., the "family resemblance" approach) (Taylor 2020) have led to perspectives such as 'Dark Green Religion' (Taylor 2010) or "implicit religion" (Bailey 2010). Such scholarship has focused on messy, hybrid or experimental forms of religion that do not adhere to formalised boundaries (e.g., Kidwell 2019).

One potentially useful inclusive definitional framing of religion from the perspective of psychology is religion as a "meaning system" (Silberman 2005). This recognises that 'individuals operate on the basis of personal beliefs or theories that they have about themselves, about others, about the world of situations they encounter, and their relations to it'. These beliefs or theories 'allow individuals to give meaning to the world around them and to their experiences, as well as to set goals, plan activities, and order their behaviour they encounter, and their relations to it'. (Silberman 2005). Religious meaning systems are centred on what is perceived to be the sacred, and consists of Self and world beliefs, Contingencies and expectations, Goals, Actions and Emotions. Such a framework enables value formation and change to be viewed religiously in many contexts, including those outside formal religious organizational settings. However, from a psychological perspective, it is imperative to acknowledge that religion is "complex and diverse", and attempts to understand religion as a coherent phenomenon or to extrapolate insights from one tradition to another in a generalised way may be unhelpful and inappropriate (Watts and Bretherton 2017).

Defining values in the context of religion

A key point to begin with here is that most scholarship of religion recognises religion as a holistic and embodied human experience. For example, Haluza-DeLay (2014) defines religion as 'beliefs, worldviews, practices, and institutions that cross borders, time and scale from the level of individuals all the way to transnational and transhistorical movements'. Values are therefore intertwined with beliefs, practices, social norms and group and institutional dynamics. They are very much embodied phenomena (sensu Raymond, Giusti, and Barthel 2017). As Aldridge (2007) writes: 'The experience of being a Jew, or a Hindu, or a Mormon is often more about doing things than believing things: about abstaining from pork, or beef, or tea, coffee and cola drinks'. In any discussion of values in the context of religion, they need to remain connected to other social-psychological concepts such as beliefs and attitudes and social practices, sociological concepts of communities and institutions, anthropological concepts of human behaviour, historical appreciation of religious movements, and philosophical and theological notions of ethics, worldviews and the divine.

Before we can discuss value formation and change through a religious lens, it is important to consider different ways in which the concept of value has been used in association with religion. I draw here upon the helpful partitioning of 'value sources' the authors of *Chapter 2* of the IPBES values assessment have already proposed: namely individual/collective sources of values, non-anthropocentric values and encounter based processes.

Individual/collective source

From a sociological and institutional standpoint, religion has been conceived of as providing a framework for society's transcendental values. Talcortt Parsons is one scholar who expounded this view: 'For Parsons, religion provides a transcendental grounding for a society's ultimate values. All our rules of conduct, folkways, mores and social norms are derived in the final analysis from these ultimate values' (Aldridge 2007, 106).

Religious traditions have also been understood as possessing particular sets of 'values'. Much work has been undertaken to identify 'common values' espoused by all the dominant wisdom traditions. One particular effort in this regard was the Harvard conference series on World Religions and Ecology (1996-1998). This resulted in the identification of seven "values" for human-earth

flourishing shared by the world religions: reverence, respect, restraint, reciprocity, redistribution, responsibility and renewal (Grim and Tucker 2014).

In some literature and discourse, religion or spirituality has been used as a qualifier (adjective) for certain types of transcendental values. For example Wangari Maathai' in her book "Replenishing the Earth: Spiritual Values for Healing Ourselves and the World" emphasizes certain "intangible" "spiritual" values that enabled the success of the Green Belt Movement in Africa. These values were (i) love for the environment, (ii) gratitude and respect for the Earth's resources, (iii) self-empowerment and self-betterment, and (iv) the spirit of service and volunteerism and are said to have been connected to a divine "Source" (Maathai 2010).

Finally, from a psychological perspective, "values and the conflicts that can arise among them are manifestations of religious beliefs" (Paloutzian and Park 2005, 340). This link between religious beliefs and transcendental values has been identified empirically. For example Schwartz and Huismans (1995) identified that religiosity of adherents to Orthodox, Catholic, Protestant and Jewish faiths correlated positively with benevolence, tradition, conformity and security values, and negatively with power, achievement, hedonism, stimulation, and self-direction. A meta-analysis conducted in 2004 showed that religious people rated highly on values that promote conservation of social and individual order along with limited self-transcendence (i.e., benevolence but not universalism) (Saroglou, Delpierre, and Dernelle 2004)

Non-Anthropocentric value formation

A substantial amount of scholarship exists on the topic of the philosophical values for nature and how religion might offer a strong ethic for conservation and environmental protection. The writings of Holmes Rolston are a helpful place to look for an outline of these arguments (e.g., Rolston 2006). This has sometimes been described as emphasizing a 'theocentric' ethic (or theocentric values of nature), as a counterpoint to biocentric, ecocentric or anthropocentric perspectives (Gustafson 1983). A "theocentric" perspective on environmental matters is one that is centred on God rather than the needs of humanity or the needs of nature (Hoffman & Sandelands, 2005).

Encounter-based processes

Religion provides a helpful lens through which to understand encounter-based processes that relate to values for nature and their formation. Given the definition of religion provided above that emphasizes both beliefs, worldviews and practices, it is evident that values in religious contexts are defined through interaction with natural features, elements or settings, or find their expression through such interactions. Scholarship on religion highlights the importance of 'encounter-based' practices and rituals that include natural elements (Grim and Tucker 2014). Ceremonies frequently adopt nature motifs and incorporate natural elements, celebrations, feasts and holidays relate to seasons, agricultural cycles and ecological features. In many Indigenous spiritualities, nature cannot ontologically be separated from spiritual or divine realities. Even the most populous world religion of Christianity incorporates nature regularly through sacraments of bread and wine in the Eucharist. Such encounter-based processes that enable values for nature to emerge have led to some of the most powerful motivations for conservation, as seen in the protection of sacred groves (e.g., Mgumia and Oba 2003).

Pathways for value formation and change

Now that religion and values have been defined and explored, we can consider how religion may intersect with value change over time. This section is based on Kendal and Raymond's recent (2019) typology of value change. Three pathways are proposed: (i) change in transcendental value composition at the group level through immigration or emigration, (ii) change in individuals'

transcendental values over time, and (iii) change in values in response to wider social-ecological contextual change. It is apparent (as will be seen below) that religion can help to make sense of value shift in all three pathways.

Immigration/emigration changes the composition of transcendental values at the group level (composition change)

Many societies are becoming increasingly diverse in ethically and religiously with time (Aldridge 2007). This trend is particularly pronounced in the West and is a function of globalisation and general shift towards ideological pluralism and social diversity. This shift in the social context of religion and belief is enabling more people to come into contact with alternative faith expressions, leading people to often hybridise religious traditions or construct their own belief systems (Aldridge 2007). Religion has been shown to be central to immigrants' sense of identity and culture, since religious gatherings and celebrations and customs help to embed a sense of cultural unity (Ebaugh and Chafetz 2000). Religion may therefore be considered a powerful vessel that carries values and enables such value shift to occur through immigration or demographic change.

Individuals change their transcendental values over time (individual and group scales)

A second and crucial dimension of value change is individuals changing values over the course of their life. As Bardi & Goodwin (2011) noted (and is acknowledged by Kendal and Raymond), such value shift can be both automatic and effortful. This is seen clearly again through the lens of religion. One evident, and well-researched, phenomenon is the transmission of religious beliefs and values from parents to children (Flor & Knapp 2001; Hoge, Petrillo, & Smith 1982), with a substantial amount of scholarship on the processes and explanations for such transmission (or lack thereof) (Paloutzian & Park 2005). For example, sociologists have proposed three key processes of socialisation within families that contribute to value transmission: inheritance of status, social learning and role modelling, and parental affection and affirmation, the latter being especially important for intergenerational religious continuity (Bengston et al., 2002). Similarly, there is literature on religion being transmitted intentionally through education and schooling. Both cases are fascinating in the context of value change, as they combine both intentional change/formation (on the part of parents) and automatic change (on the part of children).

Another intentional mode of transcendental value change over time in individuals is what has been referred to in some traditions as "spiritual formation". Religious practices such as prayer, study, meditation, liturgy or activities of worship are intended in some way to 'form' or 'shape' religious followers towards holiness, virtue, enlightenment or other desirable states. In many ways these practices may shape individuals' personal transcendental values.

A particularly acute way religion intersects with value formation and change can be observed in studies of religious conversion (Rambo 1993). Indeed, religious conversion has been one of the first psychological topics ever studied in a scientific way (Starbuck 1899). Paloutzian (2005) reviews scholarship on religious conversion by adopting the definition of 'religion as a meaning system'. Conversion can include changes in "values and attitudes expressed as new ways that one may wish to be (e.g., I want to be a good Muslim)" (Paloutzian 2005, 332). Empirical psychological research has shown that religious conversion can result in individuals holding transcendental values more strongly overall, and in the case of a study of college students who converted to Christianity, a particular increase in values of 'salvation' and 'being clean' (Paloutzian 1981). Zinnbauer and Pargament (1998) likewise found a greater sense of value change in spiritual converts. This is an area in need of much more research, particularly with respect to values related to environmental sustainability.

Social-ecological change

The third pathway of value shift that Kendal and Raymond (2019) proposed was social-ecological change. Again, religion has much to offer here in contextualising such change. Human geography literature has revealed "the emergence of more variegated and complex religious landscapes in many countries as a result of migration" (Kong 2010). Shifts have also been observed in different sites of religious practice, expressions of belief and constituencies of religious affiliation (Kong 2010). Accompanying this has been the rise of the 'post-secular' discourse, which has proposed that religious actors and institutions are as active and influential in society as ever, but their expression differs from how religion was enacted in the 19th Century. In western Europe, cities in particular are sites of religious plurality, and religion has a pronounced influence on governance, public service and the third sector (Beckford 2012; Cloke & Beaumont 2013; Baker & Dinham 2017; Berger 1999). At a broader scale, scholars of religion have argued that there is an essential link between religious belief and environmental values, seen for example in recent debates concerning the historical association between Protestant cultures and the emergence of environmentalism (Northcott, 2018; Jochemsen, 2018). Religion therefore is evidently an important factor in describing the 'social' component of 'social-ecological' change and the context for value shift, although the explicit influence of such changes in religious expression on societal values has received little research attention.

One expression of social-ecological change on religious institutions and religious values has been the emergence of an ecological-consciousness in the literature, teachings and organizational values of world religions in response to the global ecological crisis. Epitomised by publications such as the Papal Encyclical Laudato Si (On Care for our Common Home) (Pope Francis 2015), many scholars have suggested a global 'greening of religion' is underway (Chaplin 2016) and have pointed to the potential of religion to enable global environmental stewardship (Hitzhusen & Tucker 2013). Other scholars, however, have been more sceptical, suggesting that empirically, most of this 'greening' has been isolated to institutional rhetoric and action by a small community of highly visible and vocal actors that do not represent the values and behaviours of the majority of religious followers (Taylor, Van Weiren & Zaleha 2016; Taylor 2019). In any case, there is, at least in theory, real potential for religion to operate as a vehicle for transmitting social-ecological change related to environmental degradation to deeper values and ethics at both individual and group levels.

Spiritual Formation

Spiritual formation is a concept that has received substantial attention in Christian writings across a number of Christian confessions (Protestant Evangelical, Roman Catholic). It describes the process by which a believer becomes formed into "Christlikeness", whereby they exhibit a particular set of attributes such as the "fruit of the spirit" outlined by St Paul (Galatians 5:22-23): "love, joy, peace, patience, kindness, goodness, faithfulness, gentleness and self-control" (see for example Greenman & Kalantzis, 2015 for a discussion of the theory and practice of Christian spiritual formation). This change occurs over time, and particularly through practicing "spiritual disciplines", such as meditation, prayer, fasting, study, simplicity, solitude and service (see Foster, 1978).

However, spiritual growth, transformation, development and formation are not exclusive domains of Christian traditions but are present in most world religions. For example, the four stages of enlightenment in Buddhist teachings and thought exemplifies a process of change and growing spiritual awareness. Indeed, this is true in indigenous spiritualties. For example, Mosha (1999) found an inseparable link between intellectual formation (indigenous education) and spiritual formation among the Chagga people of Tanzania. To them "knowing, living and acting ethically and morally are essential elements of life" (p. 210).

References

———. (2005). “Religious Conversion and Spiritual Transformation.” In Handbook of the Psychology of Religion and Spirituality, edited by Raymond F. Paloutzian and Crystal L. Park, 331–47. New York: The Guilford Press.

———. 2020. “Religion and Environmental Behaviour (Part Two): Dark-Green Nature Spiritualities and the Fate of the Earth.” Ecological Citizen 3 (2): 135–40.

Aldridge, Alan. (2007). Religion in the Contemporary World. Second Edi. Polity.

Bailey, Edward. (2010). “Implicit Religion.” Religion 40: 271–78. https://doi.org/10.1016/j.religion.2010.07.002.

Baker, Christopher, and Adam Dinham. (2017). “New Interdisciplinary Spaces of Religions and Beliefs in Contemporary Thought and Practice : An Analysis.” Religions, 1–12. https://doi.org/10.3390/rel8020016.

Bardi, Anat, and Robin Goodwin. (2011). “The Dual Route to Value Change: Individual Processes and Cultural Moderators.” Journal of Cross-Cultural Psychology 42 (2): 271–87. https://doi.org/10.1177/0022022110396916.

Beckford, James. (2012). “Public Religions and the Postsecular.” Journal for the Scientific Study of Religion 51 (1): 1–19. https://doi.org/10.1111/j.1468-5906.2011.01625.x.

Bengtson, V. L., Biblarz, T. J. and Roberts, R. E. L. (2002) How Families Still Matter: A Longitudinal Study of Youth in Two Generations. New York: Cambridge University Press

Berger, Peter. (1999). “The Desecularization of the World: A Global Overview.” In The Desecularization of the World: Resurgent Religion and World Politics, 1–18. Grand Rapids, Michigan: William B. Eerdmans Publishing Company.

Chaplin, Jonathan. (2016). “The Global Greening of Religion.” Palgrave Communications 2 (16047): 1–5. https://doi.org/10.1057/palcomms.2016.47.

Cloke, Paul, and Justin Beaumont. (2013). “Geographies of Postsecular Rapprochement in the City.” Progress in Human Geography 37 (1): 27–51. https://doi.org/10.1177/0309132512440208.

Ebaugh, H.R., and J.S. Chafetz. (2000). Religion and the New Immigrants: Continuities and Adaptations in Immigrant Congregations. Walnut Creek, California: Alta Mira Press.

Flor, D.L., and N.F. Knapp. (2001). “Transmission and Transaction: Predicting Adolescents’ Internalization of Parental Religious Values.” Journal of Family Psychology 15 (4): 627–625.

Foster, R. (1978) “Celebration of discipline: The path to spiritual growth”. Harper Collins, New York.

Greenman, J.P. and Kalantzis, G. eds., (2015). “Life in the Spirit: Spiritual Formation in Theological Perspective”. InterVarsity Press.

Grim, John, and Mary Evelyn Tucker. (2014). Religion and Ecology. Washington: Island Press.

Gustafson, J. M. (1983). Ethics from a Theocentric Perspective. University of Chicago Press.

Haluza-Delay, Randolph. (2014). “Religion and Climate Change: Varieties in Viewpoints and Practices.” Wiley Interdisciplinary Reviews: Climate Change 5 (2): 261–79. https://doi.org/10.1002/wcc.268.

Hitzhusen, Gregory E., and Mary Evelyn Tucker. (2013). “The Potential of Religion for Earth Stewardship.” Frontiers in Ecology and the Environment 11 (7): 368–76. https://doi.org/10.1890/120322.

Hoffman, A. J., & Sandelands, L. E. (2005). Getting Right with Nature: Anthropocentrism, Ecocentrism, and Theocentrism. Organization & Environment, 18(2), 141–162.

Hoge, Dean R, Gregory H Petrillo, and Ella I Smith. (1982). “Transmission of Religious and Social Values from Parents to Teenage Children.” Journal of Marriage and Family 44 (3): 569–80.

Ives, Christopher D, and Jeremy Kidwell. (2019). “Religion and Social Values for Sustainability.” Sustainability Science 14: 1355–62. https://doi.org/10.1007/s11625-019-00657-0.

Jochemsen, H. (2018). The Relationship between (Protestant) Christianity and the Environment is Ambivalent. Philosophia Reformata, 83(1), 34-50.
Kendal, Dave, Christopher M Raymond, and Dave Kendal. (2019). "Understanding Pathways to Shifting People's Values over Time in the Context of Social-Ecological Systems." Sustainability Science 14 (5): 1333–42. https://doi.org/10.1007/s11625-018-0648-0.
Kidwell, Jeremy H. (2019). "Re-Enchanting Political Theology," no. April: 1–14.
Kong, Lily. 2010. "Global Shifts , Theoretical Shifts: Changing Geographies of Religion." Progress in Human Geography 34 (6): 755–76.
Maathai, Wangari. (2010). Replenishing the Earth: Spiritual Values for Healing Ourselves and the World. Doubleday.
Mgumia, F H, and G Oba. (2003). "Potential Role of Sacred Groves in Biodiversity Conservation in Tanzania." Environmental Conservation 30: 259–65. https://doi.org/10.1017/S0376892903000250.
Mosha, R.S., (1999). The inseparable link between intellectual and spiritual formation in indigenous knowledge and education: A case study in Tanzania. in
Northcott, M. S. (2018). Reformed Protestantism and the Origins of Modern Environmentalism. Philosophia reformata, 83(1), 19-33.
Paloutzian, Raymond F. (1981). "Purpose in Life and Value Changes Following Conversion." Journal of Personality and Social Psychology 41: 1153–60.
Paloutzian, Raymond F., and Crystal L. Park. (2005). Handbook of the Psychology of Religion and Spirituality. New York: The Guilford Press.
Pope Francis. (2015). "Laudato Si: On Care for Our Common Home." http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html.
Rambo, L.R. (1993). Understanding Religious Conversions. New Haven: Yale University Press.
Raymond, Christopher M, Matteo Giusti, and Stephan Barthel. (2017). "An Embodied Perspective on the Co-Production of Cultural Ecosystem Services: Toward Embodied Ecosystems." Journal of Environmental Planning and Management, no. January.
Rolston, Holmes. (2006). "Caring for Nature: What Science and Economics Can't Teach Us but Religion Can." Environmental Values 15 (3): 307–13.
Saroglou, Vassilis, Vanessa Delpierre, and Rebecca Dernelle. (2004). "Values and Religiosity: A Meta-Analysis of Studies Using Schwartz's Model." Personality and Individual Differences 37 (4): 721–34. https://doi.org/10.1016/j.paid.2003.10.005.
Schwartz, Shalom H, and Sipke Huismans. (1995). "Value Priorities and Religiosity in Four Western Religions." Social Psychology Quarterly 58 (2): 88–107.
Semali, L.; Kincheloe, J. (eds) "What is indigenous knowledge? Voices from the academy", pp. 209-225.
Silberman, Israela. (2005). "Religion as a Meaning System: Implications." Journal of Social Issues 61 (4): 641–63.
Spiro, M. E. (1966). "Religion: Problems of Definition and Explanation." In Anthropological Approaches to the Study of Religion, 85–126. London: Tavistock.
Starbuck, E.D. (1899). The Psychology of Religion. London: Walter Scott.
Taylor, Bron Raymond. (2010). Dark Green Religion: Nature, Spirituality and the Planetary Future. University of California Press.
Taylor, Bron, Gretel Van Weiren, and Bernie Zaleha. (2016). "Lynn White Jr. and the Greening of Religion Hypothesis." Conservation Biology. https://doi.org/10.1017/CBO9781107415324.004.
Taylor, Bron. (2019). "Religion and Environmental Behaviour (Part One): World Religions and the Fate of the Earth." Ecological Citizen 3 (1): 71–77.
Watts, Fraser, and Roger Bretherton. (2017). "' Religion ' Is Complex and Diverse" 5981. https://doi.org/10.1080/2153599X.2016.1249930.
Yinger, J. M. (1970). The Scientific Study of Religion. London: Routledge.

Zinnbauer, B. J., and K. I. Pargament. (1998). “Spiritual Conversion: A Study of Religious Change among College Students.” Journal for the Scientific Study of Religion 37 (1): 161–80.

Annex 2.4 Spotlight on fisheries, marine and coastal governance in the UK: a community voice approach

Introduction

The sea is central in the UK's cultural identity and plays an important role in people's quality of life, but coastal and marine ecosystems are under many pressures. Though some are recovering, many fish stocks continue to be depleted and their management (and who should manage them following Brexit) has attracted fierce debate (Huggins et al., 2020). There has also been an intensification of marine policy efforts through designation of a large number of marine protected areas, and national and regional plans to balance conservation and sustainable use in line with the Ecosystem Approach. These processes put increasing emphasis on inclusion of indigenous and local knowledge and values. This case considers local knowledge across UK coastal communities, based on 144 ethnographic video interviews following the Community Voice approach (Ranger et al., 2016).

Objectives

This case study seeks to reflect local knowledge from coastal communities across the United Kingdom in relation to the diverse values of nature and nature's contributions to people, with a particular focus on how local people expressed the life frames of nature's values in relation to their different values and ways of relating to the sea and coast. Within this context, there is a focus on sustainable fisheries management, but values are also expressed around broader marine issues, including marine conservation and marine protected areas, recreation and coastal access, and more broadly local people's relationships to the sea and how these contribute to wellbeing.

Methods

The approach drew on secondary data consisting of ethnographic film interview transcripts from four separate marine and coastal projects across the UK which each looked to integrate local context into the policy making agenda (Table SM2.3). The ethnographic approach considers values situated within a cultural context. The original projects addressed a diversity of issues, and used the Community Voice methodology (Cumming & Norwood 2012; Ranger et al., 2016; Ainsworth, 2019) to enhance participation and inclusion of local people in decisions, find shared values, build trust and identify solutions. The projects produced one or more documentaries that were then used for group deliberation. An explanation of the Community Voice method is provided in this short film: https://vimeo.com/150885111.

The four projects focused on fisheries management 'Common Ground' (Ranger and Richardson, 2017) and 'Marine Ecosystems Research Programme' (MERP; Ainsworth et al. 2019, O'Connor and Kenter, 2019), coastal access for marginalised communities 'Living Coast' (Acott et al. 2019), and relations between the sea and well-being ('Our Blue Heart'). Participants represented diverse stakeholders including fishers, fish supply chain, recreationalists, diverse residents (e.g., artists, teachers, historians, carers), tourism businesses, local policy makers and conservation and enforcement officers.

The data had a good spread among age groups, with participants ranging between 20 and 60+ (not specified beyond this). However, the majority of participants were male (62.9%), reflecting male dominance in key stakeholder groups such as fishermen. The vast majority were Caucasian (92.2%).

Qualitative analysis of the secondary data investigated associations between different life frames and broad, instrumental, relational and intrinsic values. We adopted a theory-driven approach (Bryman, 2017), building on the values conceptualization used within Chapter 2. Although each project differed

in terms of the questions posed to respondents, we identified consistent patterns throughout to relate back to multiple life frames. We added daughter codes to reflect emergent themes and sub-themes within the data in order to fully incorporate nuanced local values and establish patterns between locations. We re-analysed the secondary data to identify implicit associations between instrumental, intrinsic, relational values and the life frames, as well as considering how participants considered notions of sustainability in relation to marine management.

For the purpose of reliability testing, we took a representative sub-sample from MERP transcripts (O'Connor and Kenter, 2019) coded previously by another researcher who was not involved in the current analysis. For our sample, we distributed the amount of transcripts to be coded proportionally by the number of participants per sector, picking 10 total transcripts (25% of all coded) at random. Our results were compared with the original results presented by O'Connor and Kenter (2019) with an inter-coder reliability test to test agreement between interpretations of codes. The kappa score for a weighted average across codes was 0.70 (scores >0.6 indicate substantial agreement; Landis and Koch, 1977).

Table SM2.3 Overview of the four community voice projects for which transcripts were analysed, with links to the documentaries produced from ethnographic film

Project	No. of Participants	Aims/scope of project	Results previously published?	Community voice documentary
UK Marine Ecosystems Research Programme (MERP)	10 of 40*	Integrated valuation of marine ecosystems using coupled ecological-economic of the impacts of a number of hypothetical social-ecological scenarios on marine ecosystems and their services, based on the UK NEA follow-on. The ethnographic research served to complement the modelling to be more inclusive of local values and provide a appropriate vehicle for social and cultural value expression. The same storylines were used to underpin the modelling scenarios and to help structure the interview scripts. This data was used for intercoder-reliability analysis as it had been previously coded for the Life Frames and intrinsic and relational values by a different researcher.	Ainsworth et al. 2019; O'Connor & Kenter, 2019	sharedvaluesresearch.org/ merp-marinevalues
Common Ground	55	The MCS worked with Eastern IFCA to deepen and diversify engagement with the marine and coastal resource issues along the Eastern coast of England (Lincolnshire & North Norfolk). The focus was to find shared values and reduce polarisation around fisheries management, considering issues around knowledge integration; fair and effective regulation, monitoring and enforcement; fishing sustainability and viability; communication and trust; understanding of environmental issues; and the need to protect the environment. 253 actions were recorded that participants felt could address the issues.	Ranger and Richardson, 2017	vimeo.com/191148781
Living Coast	34	Aimed at marginalised communities who may have significant barriers in place to their connection with the coast and sea (poverty, lack of public transport, disabilities etc). As part of a project with Natural England, the University of Greenwich and the Marine Conservation Society, researchers examined	Acott et al. 2019	youtu.be/jJB94V2g7LY

		connections with the coast and sea in both Portsmouth and the County Durham. Interviewers posed the idea of a 2,700 mile coastal path that spans the entire English Coast, which would provide greater access for public recreation.		
Our Blue Heart	45	Aimed to obtain a 'snapshot' of people's connections with the coast and sea, to get to heart of what the sea means to people in the UK. Interviews were conducted across multiple coastal regions. From the transcripts, we coded responses based on values and sentiments expressed for a response to each question posed. As a result, one transcript is not uniform in the values expressed, but rather show a range of context specific and broader values throughout.	No	mcsuk.org/our-blue-heart

** sub-sample of 25% taken for intercoder reliability test*

Results

Life frames were associated with values (Figure SM2.2) in quite similar veins to the analysis of the *Chapter 2* systematic literature review literature (*Annex 2.15*). Participants' instrumental values were almost solely expressed through a living from frame (Figure SM2.2). Cluster analysis showed juxtaposition between *living from* and instrumental values, and the other frames and values, again showing very similar to trends in the environmental values literature and analysis of fisheries documents presented in other annexes. 54% of all interviewees referred to three or more life frames and 24% referred to all four. Desires for environmental sustainability and nature conservation were primarily (66%) co-referenced with *living with* and frequently highlighted irreplaceability or basic goodness of nature and values independent of NCP. Embodied values were referenced by 32% of participants, representing the majority (60%) of living as references. For example, one participant noted: "It's just you feel part of it, it's like being a plant. I felt like a plant that had gone back into the right soil when I came here to live."

Overall, *living in* was most referenced, with *living with* taking second place and *living as* least referred to. Each of the four projects was set in different policy contexts that influenced which life frames and associated values people emphasized (Figure SM2.3). MERP focused on balancing marine livelihoods with nature conservation, with participants being asked to evaluate various scenarios. Blue Heart and Living Coast used a conversational approach about the meaning of the coast to community; Blue Heart at a broad scale (across the UK), with Living Coast aimed at east coast marginalised communities experiencing barriers in accessing the sea, explaining the dominance of living in. Common Ground brought viewpoints from diverse stakeholders on marine conservation policies implemented by a regional fisheries management authority as such living from was most strongly represented here.

Life frame codes were sparsely co-coded between each other; however cluster analysis showed some similarity (Figure SM2.4) between *living in* and *living with* (Jaccard's coefficient 0.642), *living with* and *living as* (0.559) and *living in* and *living as* (0.544). *Living from* showed moderate similarity to *living in* (0.520), but less agreeability to *living as* or *with* (<0.45).

Table SM2.4 Examples of quotes given during interviews and associations with life frames and specific values.

Project	Life frame implied	Quote	Value (interpretation)
Common Ground	Living From	Not to that extent. I mean we've always looked at it as an area where wildlife was and where you could catch the fish. Not every part of the beach will fish as good as other parts, you know, there's some areas you can go, and you aren't going to get. You move a couple of hundred yards along and that area will produce fish. It's knowing the benefit of looking at the seabed when the tides out and you can say 'That's not a bad spot, we'll fish there' and it does produce results.	Instrumental (means to a human end)
Our Blue Heart	Living In	When you've lived by the sea it's hard to live anywhere else. And I think for different reasons really, it wasn't a conscious decision to move here, but just for various reasons I ended up moving to here in about four or five different moves.	Relational (meaningful and non-substitutable relationships)
Common Ground	Living As	From being born into it it's...I think I probably take for granted how it makes you feel, but...it's the self. You're out there. You're in charge of your own destiny.	Relational (constitutive relationship, identity)
Our Blue Heart	Living As	You can sit and watch and watch and watch and you can get lost just watching the waves roll in quite easily. You know, there's something about water as well in that sense of ever moving, ever changing. Even just watching a river running over the rocks can be a fascinating experience that you lose yourself in, and watching the sea come in, especially if it's, you know, a heavy sea and there's big waves and you get that sense of the power of the sea and just how amazing it can be watching it.	Intrinsic (value without reference to humans as valuers, objective properties); Relational (embodied meaningful relationship)
Common Ground	Living With	I think what needs to change is that the bottom line for everything seems to be money. So...and I mean everything, everything on this planet. The bottom line is money. So if there is no financial value to it it doesn't happen. And do I think we talk about our coasts and things in terms of the money they bring in and the tourism. I think we all have to value these spaces in their own right. I think there has to be a sea change. No pun intended. I think we really have to get that unless we safeguard this we're gonna lose it. So it means valuing it personally, it means everyone understanding it and valuing it personally and money doesn't come into it.	Intrinsic (non-instrumental value, value without reference to humans as valuers)
Our Blue Heart	Living As	Fantastic. Fantastic. In the womb of the world. And you don't-- yeah, I think that there-- it's an incredible connection that they have and it does give them humility and it does teach them wider-- a wider understanding, beyond them as their little individual selves. Which then means that you have a responsibility, doesn't it? That you are a part of your community and you are part of a bigger community. You know, when you see the rubbish washed up on the beach that has no English on it and you realise that actually we are profoundly connected through this water	Relational (reciprocal relationships, embodied relationships)

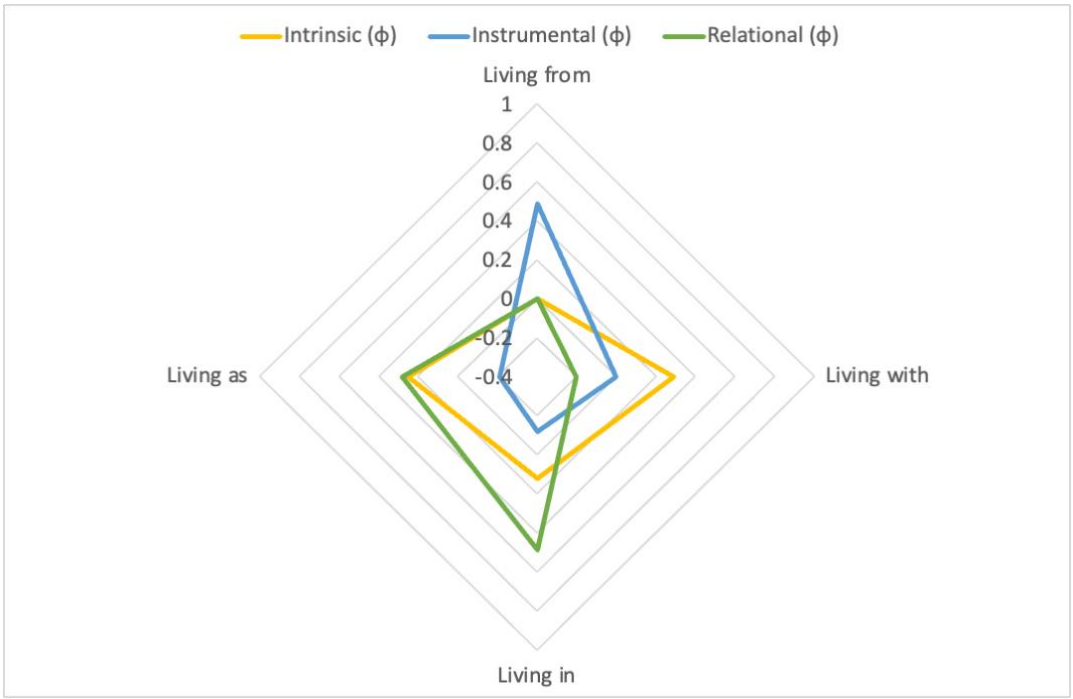

Figure SM2.2 Correlations (φ) between references to life frames and instrumental, relational and intrinsic values in UK marine local knowledge. Positive values below 0.3 indicate a weak correlation, from 0.3 and above a moderate correlation, and from 0.7 (φ) and above a strong correlation.

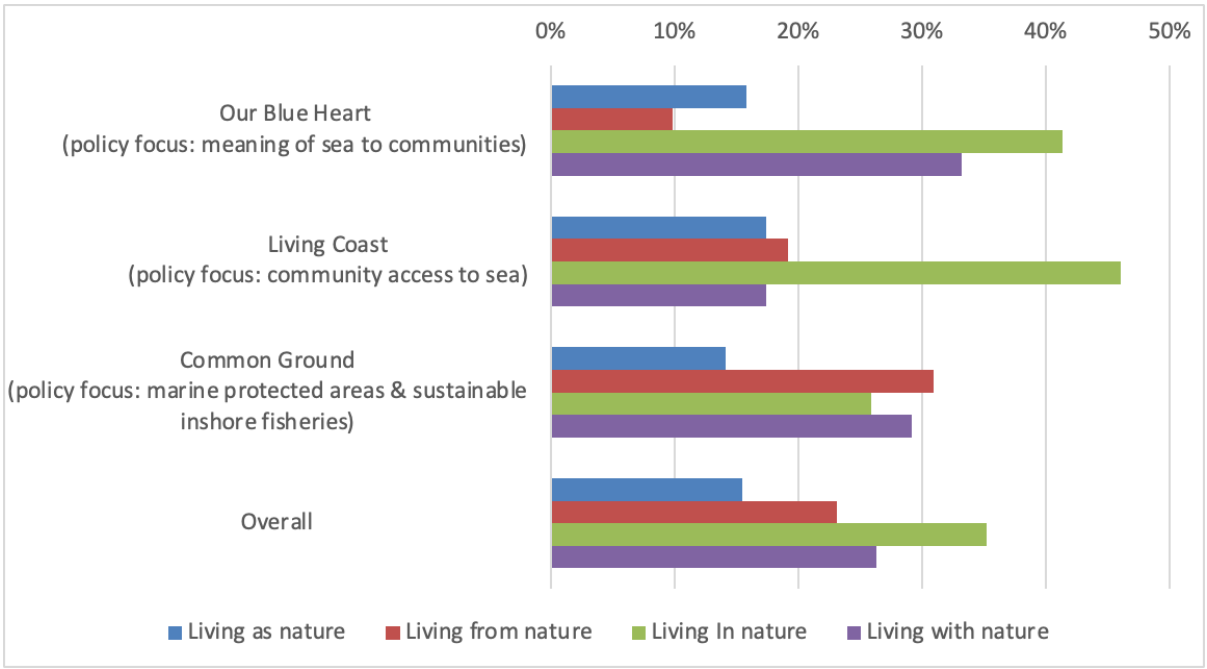

Figure SM2.3 References to different life frames in UK marine local knowledge data (MERP data excluded due to smaller sample size).

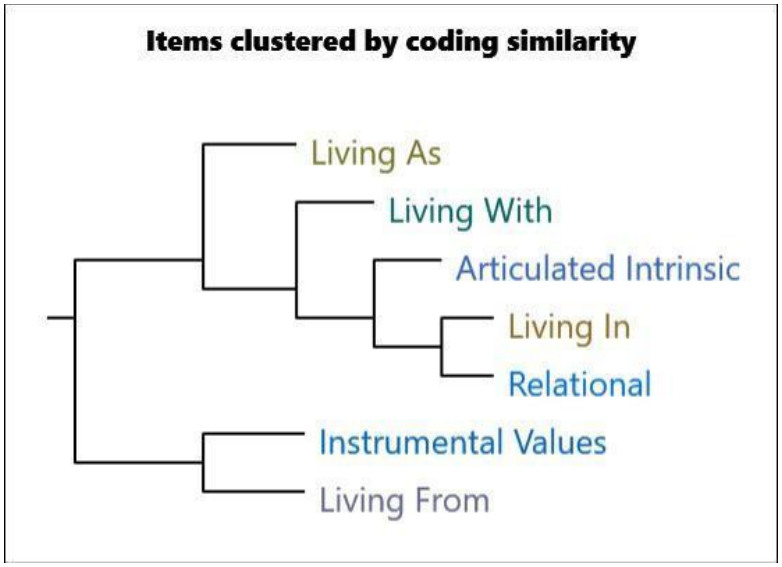

Figure SM2.4 Items clustered based on coding similarity (Jaccard's coefficient)

Main conclusions and implications for decision making

This case study exemplifies how local people can express nature's values within multiple life frames, but also that what frames and associated values are emphasized depends on policy focus and valuation design. The interviews were developed in collaboration with decision makers, feeding into deliberative processes to help better integrate plural values into decision challenges and assess the relative weights of different values. While many NCP were expressed as important in the interviews, local people also strongly associated sustainability with the importance of nature beyond its contributions to people. They also clearly pointed to both cognitive and embodied ways of experiencing and expressing values. Thus, if policy makers wish to include community voices in decisions and more effectively leverage values towards sustainability transformation, the living with and as frames need to be attended to alongside benefits-based framings of nature.

The diverse participants across the cases, which covered large stretches of the UK coastline, frequently aligned with intrinsic and relational value expressions when discussing sustainability and ways in which this would be achieved, for example expressed through notions of being part of a sentient world or mentioning nature's right to exist aside of humanities benefits from it, or reciprocal responsibilities or duties of care. This highlights the importance of inclusion of multiple frames that help express these values, including recognizing the importance of place-based NCP through the living in frame and looking beyond NCP to broader values of nature through the living with and living as frames to recognize local people's emphasis on non-instrumental values as levers for sustainability. The study also points to the way the focus of a valuation influences what frames and associated values are emphasized in its results, indicating that an emphasis on one of the frames is likely to skew results to reflect this framing.

Future studies could capitalise on the less restrictive nature of the life frames when framing cultural values as a lever for sustainability, as it enables values, actions and choices to be explained on the basis of a values continuum rather than as bounded, abstract ethical categories. As found in this study, this can more accurately reflect the sentiments and experiences of people who engage with the environment through multiple life frames that embed values that are often juxtaposed, such as those whose livelihoods are tied to the health and productivity of the natural environment, but also feel a strong emotional attachment to the environment independent from their ability to make a living. Moreover, it further highlights the potential for more comprehensive and focused studies that relate to the role of community values in policymaking and sustainability transformation.

References

Acott, T. G., Cumming, G., Ford, A., Ranger, S., & Richardson, P. (2019). Living Coast—Understanding Local Perspectives and Values of the Coast using Community Voice Method in Portsmouth and on the Durham Heritage Coast. Natural England Commissioned Reports, 282.

Ainsworth, G. B., Kenter, J. O., O'Connor, S., Daunt, F., & Young, J. C. (2019). A fulife frameilled human life: Eliciting sense of place and cultural identity in two UK marine environments through the Community Voice Method. Ecosystem Services, 39, 100992. https://doi.org/10.1016/j.ecoser.2019.100992

Bryman, A. (2017). Social Research Methods. Third Edition. Oxford University Press, Oxford.

Cumming, G., & Norwood, C. (2012). The Community Voice Method: Using participatory research and filmmaking to foster dialog about changing landscapes. Landscape and Urban Planning, 105(4), 434–444. https://doi.org/10.1016/j.landurbplan.2012.01.018

Landis, J. R. and Koch, G. G. (1977) 'The Measurement of Observer Agreement for Categorical Data', Biometrics, 33(1), p. 159. doi: 10.2307/2529310.

Huggins, C., Connolly, J., McAngus, C., & Zwet, A. van der. (2020). Brexit and the Uncertain Future of Fisheries Policy in the United Kingdom: Political and Governance Challenges. Ocean Yearbook Online, 34(1), 20–42. https://doi.org/10.1163/9789004426214_003

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. Scopus. https://doi.org/10.1007/s11625-019-00715-7

Ranger, S., Kenter, J. O., Bryce, R., Cumming, G., Dapling, T., Lawes, E., & Richardson, P. B. (2016). Forming shared values in conservation management: An interpretive-deliberative-democratic approach to including community voices. Ecosystem Services, 21, 344–357. https://doi.org/10.1016/j.ecoser.2016.09.016

Ranger, Sue, & Richardson, Peter. (2017). Common Ground Final Report. Marine Conservation Society. https://www.eastern-ifca.gov.uk/wp-content/uploads/2020/03/Common-Ground_final-report1.pdf

Annex 2.5 Niyamgiri Mountain, India

Case basic description

In 2003, Vedanta Resources, a UK-based mining company signed an MoU with the Government of Odisha (GoO) to construct a 1 MTPA alumina refinery and coal thermal plant (75 MW — half a million TPA of coal) at Lanjigarh in Kalahandi district. In September 2004, the Ministry of Environment and Forests (MoEF) gave environmental clearance to the company on the basis of the company's assertion that it would not divert forestland. It also proposed to extract bauxite from the area adjoining the refinery, which is estimated to have approximately 73 million tonnes of mineable ore from the adjoining Niyamgiri hills in Kalahandi and Rayagada districts. The Niyamgiri mountain is forested with sal trees (Shorea robusta) and provides habitat for diverse species of plant and animal life. It is also the means of living for the Dongria Kondh and Kutia Kondh, who regard the Niyamgiri hills as sacred and believe that their survival is dependent on the integrity of its ecosystem (Saxena et al., 2010). The two communities are scheduled tribes, granted special protection regarding land governance and customary tenure under the constitution. In the high-profile case related to Niyamgiri mountain, these rights played an important role, but in many other situations these rights have not been honoured.

In 2004 three environmentalists petitioned the Indian Supreme Court to challenge the clearances granted to Vedanta's Langijarh alumina refinery. The petitioners alleged that the company had provided wrongful information to the effect that the refinery would not require forestland. In 2005, the Central Empowered Committee (CEC), tasked by the Supreme Court to investigate the case, undertook a fact-finding mission. It issued a damning report (CeC, Central Empowered Committee, 2005) which noted the lack of in-depth studies about impacts of the mine on the water regime, flora, fauna and on the Dongria Kondh tribes living at Niyamgiri Hills and recommended the revocation of the environmental clearance of the refinery project and a ban on the mining operation at Niyamgiri (Sahu, 2008).

The court then referred the case to the Minister of Environment and Forests (MoEF), which in turn engaged the Wildlife Institute of India to examine the project's expected impacts. Throughout the legal process various petitions were filed with the court, employing a range of litigation and valuation strategies including a cost-benefit discourse and arguments regarding ecological values and cultural rights of the local tribes.

On August 8, 2008 the Supreme Court disregarded the CEC’s recommendations and approved the clearance of forestland for mining in the Niyamgiri Hills. This judgment was met with mass-scale protests and objections. Despite vociferous protests, blockades and mobilizations by the Dongria Kondh and national and international allies throughout 2008 and 2009, environmental clearance was granted to Sterlite Industries in April, 2009 for mining operations.

In the face of the continuous protests of the Dongria Kondh and the outpouring of support for the tribe, the Government of India sent a team of experts to the Niyamgiri Hills in 2010. The team of experts, in a March 2010 report, concluded that Vedanta’s proposed bauxite mine would be detrimental to the existence of the Dongria Kondh and recommended the government to deny forest clearance.

In a landmark decision for tribal rights in India, the Supreme Court on April 18, 2013 rejected the appeal on the mining ban and decreed that the Dongria Kondh would have a decisive say in giving the go-ahead to Vedanta’s mining project. The court recognized that the Dongria Kondh’s right to worship their sacred mountain must be ‘protected and preserved’ and that those with religious and

cultural rights must be heard in the decision-making process. The court provided them with three months to come to a decision about the mining project.

Following this, the Odisha government drew a list of 12 affected villages in Rayagada and Kalahandi districts, to hold palli sabha (referenda in their local councils). In July 2013, all 12 villages unanimously voted to reject the mining project in the first ever environmental referendum in India.

Case relevance to chapter themes

Niyamraja created fruits in the hills, grains in the plains
He is the first of the Dongria Kondh
No one knows his story, lakhs of people are unaware
I will sing, I will sing why the outsiders must spare our land
After making pineapple, mango, jackfruit and grains
Niyamraja said to us 'live on what I have given you'
Niyamraja decided where there would be fruits and grains
Which seed will be soft and which one would be hard.
What will we do without the fruits, grains and buffaloes,
What will we do without Niyamgiri...
What will the animals do without the big forests,
What will we do without the plants that save lives.

-From the lament of Niyamraja, sung by the late Dambu Praska
(Source: Culture unplugged.com 2008)

This case pitted two different value systems and related worldviews against each other. The first is a developmentalist perspective based on the idea of a linear path from primitive societies to industrialization, with the assumption that local and national economic growth and development will lead to improved well-being. The second is a perspective that values cultural and biodiversity values and the inherent dignity of communities to define their own livelihoods in line with their cultural values. Another key value / worldview informing the process was regarding "conservation"; this perspective involved considerations of what conservation means (what should be conserved and by whom), and how this was reflected in the process of valuing the forest.

Examples help to demonstrate the interactions between these perspectives. The 2007 court judgment framed the decision as one that called for a "delicate balance between conservation and development". The judgement stated that: "On the one hand, public interest lies in industrialization which would lead to prosperity of the area, and in infrastructure development, creation of new job opportunities. This would help in bringing these underdeveloped areas closer to the average rate of growth of GDP. On the other hand lies the need for conservation.".

Further, at first the only values that the court considered were monetary ones and conservation (ecological) values. Padel and Das (2010) write that the 2007 hearing focused exclusively on compensatory measures, with environmental, social and cultural concerns left by the wayside. When the petitioners tried to present objections on behalf of the Dongria Kondh, the judge Arijit Pasayat did not allow Mr. Sanjay Parikh to speak on behalf of the tribal people of Lanjigarh, stating that "tribal people have no place in this case" (Padel and Das, 2010, p. 184).

The invisibilization of values other than monetary and ecological values occurred despite the deep interlinking of the Dongria´s worldview with the Niyamgiri Hills. For the Dongria Kondh, the Nyamgiri mountain range is sacred and considered the resting place of the god Niyam Rajah. "Niyamgiri means the mountain (Giri) that upholds the Earth and the law of the Universe (Niyam). These mountains are the ancestral domain of the Dongria, Kutia and Jharania Kondh; the mountains not only provide them with life and livelihoods, they are also worshipped as the upholders of the

Earth and the laws of the Universe" (Writ Petition, 1995 No. 549). The petition goes on to explain that due to the belief that the hill-top is the abode of the gods, it is considered "taboo" and is traditionally left intact, and no chopping, felling, or hunting is permitted. Given this, a mine blast on the mountain would be an attack on their deity. The Dongria Kondh's way of life provides a means of surviving on these sacred mountains. Owning land on the Niyamgiri Mountains is a critical element of declaring a person as belonging to the tribe. Implementation of the mining project would therefore have caused the Dongria Kondh to lose their homes, their culture and heritage, and most importantly, their identity.

The environmentalist´s petition therefore argued that it was also imperative to consider the religious practices and beliefs of the Dongria Kondh, since these practices are among the key factors that support the existence of the rich biodiversity in the Niyamgiri hills.

While the petitioners argued that "the Dongria Kondhs have been therefore protesting against the intrusion into their cultural space" (Writ Petition, 1995 No. 549), the Government of Orissa attempted to diminish indigenous values and culture and to paint the communities as agents of ecological degradation and in need of "development" (Supreme Court of India, 2005.; P.6–7) writing: "It is easy for non-resident urban environmentalists and advocacy NGOs to romanticize tribal way of life and culture in the sylvan backdrop of forest and biodiversity. However, a reality check would reveal a life of abject poverty and deprivation bordering on dehumanizing conditions. To preserve the primitive tribes as a museum specimen is never the objective of tribal development. The practice of shifting cultivation is extremely harmful for the hills and is against the conservation of forest and environment. Preserving the tribal culture and custom, never means to allow them to do this destructive and subsistence agriculture practice and allow them to lead a life in illiteracy, poverty and hunger in perpetuity."

Exercises in valuing Niyamgiri

Net Present Value

This conflict led to multiple attempts by two distinct committees (the CEC and the Chopra Committee) to establish the Net Present Value of the forestland to be converted. Activists also implemented a cost-benefit analysis (of which Net Present Value was a component) to demonstrate that the value of the Niyamgiri hills was superior to the mining project. These analyses were submitted to the courts and played a substantial role in their deliberations. Such calculations are examined in detail in Temper and Martinez-Alier (2013).

First, Martinez-Alier and Temper (2013) define NPV and the court's specific directives in this case: "NPV is the present value (PV) of net cash flow from a project, discounted by the cost of capital. As the court clarified, NPV was to represent not the stock nor the replacement value of the wealth of the forests themselves (which in theory were already accounted for due to the need for compensatory afforestation); but rather the loss of 'the discounted sum of rupee values of ecosystem goods and services that would flow from a forest over a period of time net of costs incurred.' The calculation of NPV thus involved the identification of the tangible and intangible forest goods and services into discrete units that could then be translated into monetary units" (pg 81).

Martinez-Alier and Temper (2013) describe the differences between the NPV calculations, and therefore final NPV amounts, between the CEC and the Chopra Committee. In particular, they describe how the Chopra committee identified seven "goods or services" as components of the forest's NPV. The CEC calculation included these "goods and services," and added flagship species and bioprospecting.

One conclusion Martinez Alier and Temper reach is that "the CEC did not consider many locally relevant values" (pg. 82). As one example of this, in the CEC calculation, thirty-three percent of the Total NPV comes from flagship species -- a concept that, Martinez Alier and Temper (2013) note, is problematic for multiple reasons. These reasons include that high values for flagship species are based mostly on tourists' Willingness-to-Pay (rather than values to local people), and also may not represent ecological value, since flagship species are not necessarily ecological linchpins, as are keystone species. As a second example, the CEC discrepancy between the NPV from ecotourists and the NPV from Non-Timber Forest Products is very large -- probably because the CEC did not include many values relevant to local communities. For instance, the CEC calculation did not include the value of fuelwood collected by local people. As Martinez-Alier and Temper (2013) point out, this provides a clear example of the well identified phenomenon of the "under-representation of the needs of those with low purchasing power in valuation exercises" (pg. 82).

The role of NPV and cost-benefit analysis is even more central and complex in this case. After the CEC and Chopra Committee NPVs were completed, a local NGO (i.e., environmental activists) conducted a cost-benefit analysis of its own. This CBA "involved a crude effort… to make an estimate of cost of those environmental externalities which can be calculated for the Niyamgiri mining and the Lanjigarh alumina refinery'" (Martinez-Alier and Temper 2013, pg. 84). As Martinez-Alier and Temper note, "sometimes environmental activists insist on computing economic values for resources to argue for their preservation. Yet, the limits of such a reasoning are patent here" (pg. 84).

The details of the limitations of the CBA to capture what really matters are detailed in Martinez Alier and Temper (2013). A core insight is that the analysis noted "that the vast majority of socio-environmental costs were 'incalculable.'" These "incalculables" included "environmental impacts such as the red mud 'cocktail of deadly heavy metals and caustic soda' that could leach into groundwater or spread as dust; the risk of a breach of the red mud dam into the Vamshadhara river; and emissions of sulfur dioxide and other gasses, as well as social impacts 'that cannot be translated into monetary terms' including the rise in HIV cases and how the influx of illegal liquor would lead to violence, drunkenness and the breakdown of tribal social structures" and Niyamgiri Hill's "'incalculable' religious and cultural value to the Dongria Kondh" (pg. 84). In the CBA, most of these "incalcuables" were given a value of zero. This fact provides an excellent example of the shortcomings of NPV calculations.

Temper and Martinez-Alier (2013) ultimately conclude that these valuations were counter-productive. They argue that "Examining forest valuation in India and lessons from the Niyamgiri case we find that economic valuation fails here both as a means for conservation as well as for a tool for environmental justice. While in principle one may appreciate the contention that money valuation increases the social visibility of environmental products and services, the first section has demonstrated some of the problems in operability of NPV. There is simply no correct and possible way to value all aspects of our environment, so some values get left out, complexity is obscured, while valuations are plagued with arbitrariness regarding what to value and the discount rate. The empirical record further supports the contention that NPV compensation has not slowed forest diversion in India.

Thus the naive initial enthusiasm on the part of environmentalists seduced by the promises of the Chopra committee that "forests will finally get the right price tag" (Ghosh, 2006), soon turned to acrimony as they saw how the tool was wielded: "If you can pay, you can cut the forest, destroy the wildlife. No forest is so priceless it cannot be cut, or land so inviolate it cannot be had. Not by the poor, but by the rich" (Narain, 2008).

Other value-articulating approaches

Alternately, we might understand the protests themselves as value-articulating institutions (Temper et al 2020), including the alliances and frictions between actors in the movements, for example between local, national and international actors and between those campaigning on indigenous rights vs. environmental protection, etc (Kumar 2014, Kraemer et al 2013).

The court as an arbiter is another value-articulating institution, mandated with weighing the values presented. Finally, the Pali Sabhas (local council referenda) were later charged with deciding whether they supported the mining project through a democratic process.

Institutions

Relvant institutions for this case include the Supreme Court of India, the expert committees such as the Central Empowered Committee, the Ministry of Forests and the Environment, the Chopra committee, etc. local, domestic and international NGOs and ultimately the local Pali Sabha. Further, specific laws and policies regarding forests and adivasis (e.g., the Forest Rights Act) are also relevant.

Values and Justice

As described above, after initial attempts to exclude indigenous perspectives, indigenous cultural rights were finally recognized and a democratic process was instituted for decision-making. Yet while rights to the forest were ultimately recognized in this case and the mining project was stopped, it is difficult to argue that distributive, restorative and epistemic justice have been served in this case.

Regarding distributive justice, the refinery continues to function and the lives of the local communities continue to suffer from the pollution and disruption from the project (which currently sources bauxite from other regions of Odisha, leading to further conflicts along the commodity chain from point of extraction to transport, as heavy trucks ply the roads kicking up dust for surrounding villages.)

Regarding epistemic justice, while the rights of the adivasis were recognized, this remained within the liberal legal tradition. For example, Jairam Ramesh, the Minister of Environment emphasized that in the Niyamgiri case: “There was no emotion, no politics, no prejudice in this decision. It was not because Niyamgiri is considered sacred [by the Dongria Kondhs]. It is a decision on a purely legal basis.” He was at pains to highlight that the decision was taken merely on procedural elements of justice.

Epistemic justice in contrast, as argued by Temper (2019; 14) would entail: “the opening up of concepts of nature and meaningful intercultural communication. The challenge for transformative epistemic justice here is not in translating indigenous concepts into terms comprehensible to liberal legal traditions but rather further developing through education, intercultural communication and listening, the interpretative “hermeneutical” resources to make sense of indigenous experience and perspectives. From here may emerge the possibility to transcend colonial and liberal constructs and open other worlds and other relationships with land, territory and nature… Enactment of epistemic justice rests on questioning the knowledge structures through which decisions are made themselves; and creating and asserting their own processes and practices relying on their own knowledge, language and ways of seeing and being the world.”

References

Andelman, S., Fagan, W. (1999). Umbrellas and flagships: efficient conservation surrogates or expensive mistakes? PNAS 97 (11), 5954–5959.

CeC (Central Empowered Committee). (2005). Report in IA No. 1324 Regarding the Alumina Refinery Plant Being Set up by M/s Vedanta Alumina Limited at Lanjigarh in Kalahandi District, Orissa, 21 September, 2005.

Culture unplugged.com. (2008) The Lament of Niyamraja. *http://www.cultureunplugged.com/play/57/The-Lament-of-Niyamraja quoted in Tatpati, Kothari, Mishra 2016.*

Ghosh, P. (2006). Pricing forests: Net Present Value assessed. Down To Earth Maga-zine, 30 June 2006.Government of Orissa, Economic Survey (2003–04 &2008–09).

Kraemer, R., Whiteman, G. and Banerjee, B. (2013). Conflict and astroturfing in Niyamgiri: The importance of national advocacy networks in anti-corporate social movements. Organization Studies, 34(5-6), pp.823-852.

Kumar, K. (2014). The sacred mountain: Confronting global capital at Niyamgiri. Geoforum, 54, pp.196-206.

Narain, S. (2008).Our quality of mercy. Down to Earth. (August 29, 2008).

Padel, F., Das, S. (2010). Out of this Earth: East India Adivasis and the Aluminium Cartel. Orient Blackswan, Delhi.

Sahu, G. (2008). Mining in the Niyamgiri Hills and tribal rights. Econ. Polit. Wkly. 43 (15), 19–21 (April 12–18).

Saxena, N.C., Parasuraman, S., Kant, P., Baviskar, A. (2010). 'Report of the Four Member Committee for Investigation into the Proposal Submitted by the Orissa Mining Company for Bauxite Mining in Niyamgiri'. Ministry of Environment and Forests, Government of India, New Delhi. http://164.100.194.13/allied_forclr/htmls/CECReport/ ReportofCEC.htm

Supreme Court of India. (2005). Submissions in Response to the Report Dated 21.09.2005 Filed by the CEC. IA No. 1324 of 2005. Writ Petition No. 202 of 1995

Tatpati, M., Kothari, A., & Mishra, R. (2016). The Niyamgiri Story: Challenging the Idea of Growth without Limits? In N. Singh, S. Kulkarni, & N. Broome (Eds.), Ecologies of Hope and Transformation (p. 42).

Temper, L. & Martínez-Allier, J. (2013). The god of the mountain and Godavarman: Net Present Value, indigenous territorial rights and sacredness in a bauxite mining conflict in India. Ecological Economics 96, pp. 79-87.

Temper, L. (2019). Blocking pipelines, unsettling environmental justice: from rights of nature to responsibility to territory. Local Environment, 24(2), pp.94-112.

Temper, L.; Avila, S.; Del Bene, D.; Gobby, J.; Kosoy, N.; Lebillon, P.; Martinez-Alier, J.; Perkins, P.; Roy, B.; Scheidel, A.; Walter, M. (2020) Movements shaping climate futures: A systematic mapping of protests against fossil fuel and low-carbon energy projects. Environmental Research Letters. https://iopscience.iop.org/article/10.1088/1748-9326/abc197/meta

Annex 2.6 Klamath River Basin

Objective

The case shows process and solution paths to a complex and multi-layered environmental conflict encompassing multiple and diverse values, institutions, worldviews and knowledge system (including ILK).

Methods

The evidence to support this case-study has been collected and synthesized from academic peer reviewed publications and key policy documents. The Klamath River Basin has been a hub for research across disciplines; a Web of Science search of the terms "Klamath River" OR "Klamath Basin" returns 340 publications in 70 different topic areas. Many of the academic articles include first-hand accounts and direct quotations from individuals living in the Klamath Basin. After a first general search and collection of documents, the material was analysed and organized according to a template common to chapter 2, with extraction of information relevant to the different key messages and topics addressed in the chapter. In particular, the case study was used to articulate the role of institutions and multiplicity of diverse values in environmental conflicts.

Summary

The Klamath River is the fourth largest river in the U.S., provides habitat for threatened and endangered Pacific Salmon, and is home to numerous indigenous tribes (Albertson, 2019; Chaffin et al, 2019; Norgaard 2019; Sarna-Wojcicki et. al 2019). The seasonally and inter-annually fluctuating water is shared between stakeholder including farmers, indigenous communities, fisherman, power companies, and wildlife (Chaffin et al., 2019). In 2001, conflict erupted between water users when a U.S. federal agency withheld irrigation water from farmers to protect endangered fish (Albertson 2019; Sarna-Wojcicki et al., 2019; Chaffin et al., 2019; Doremus and Tarlock, 2008), resulting in over $200 million of losses (Levy, 2003) and protests (Albertson, 2019; Chaffin et al., 2019). The following year, the federal government did not withhold water from agriculture resulting in the largest fish kill on record and costing fishing industries over $80 million (Sarna-Wojcicki et al., 2019, CDFG, 2004; USFWS, 2003). In 2006, the license to operate the dams expired and pressure from grassroots protests convinced the operating company to launch a collaborative to decide the future of the Klamath River (Albertson, 2019; Sarn-Wojcicki et al., 2019; Doremus and Tarlock, 2008). The collaborative agreed to remove some dams and maintain higher water levels (Biondini 2017; Milner, 2015). However, the historic agreement was never funded and there continue to be conflicts over water in the Klamath River Basin.

Key message(s)

The information in this case study directly and indirectly supports the following key messages.

- Predominant environmental governance frameworks have privileged instrumental values (e.g., markets). This value expression has contributed to the present biodiversity, climate and health crises. Frameworks that enable the expression of other value types can support sustainability outcomes (e.g., inclusive wealth accounting, participatory management), but careful attention should be paid to the complexity of factors that relate values and behaviour.
- Value expression and prioritization is influenced by (i) which actors have the power to make decisions and (ii) under what kinds of governance frameworks decisions are made and implemented. By strengthening the role of participatory processes and forming appropriate governance frameworks, the multiple perspectives of instrumental, relational and intrinsic

values can be articulated. Therefore, policies need to establish participatory process and governance frameworks that can facilitate multiple perspectives on instrumental, relational and intrinsic values of nature.

- When developing policy, decision-makers encounter stakeholders who conceive nature's values and NCP differently. Clarifying the similarities and differences between these conceptualizations can allow better engagement between policy domains, academic traditions, and social groups or cultures.
- Conceiving nature's values in economic terms, including through monetary valuation, market and non-market values, economic incentives and macroeconomic indicators, plays a predominant role in understanding and managing human-nature relationships in many individual, corporate and governmental decisions. These approaches effectively highlight the dependence of economies on nature, but are limited by inadequately representing multiple value perspectives, especially intrinsic and relational values. Including diverse economic approaches and employing multiple indicators can help implement nature's multiple values in both valuation and policy. However, policies which do adequately address a plurality of values are often stymied by inadequate financial support.
- Multiple values arise in the context of the diverse ways humans understand and inhabit the Earth based on diverse worldviews, cultures, knowledge systems and languages that have developed from people's long-term, place-based relationships with nature and other ways of inhabiting the earth. Philosophies of good living offer pathways to achieving collective human-nature well-being articulating diverse values with practices and institutions.
- The multiple values of nature and the different ways of relating to nature can be effectively organized and communicated through 'life frames' of nature's values: living from nature, living with nature, living in nature and living as nature. The living from framing has been heavily privileged in research and policy. A more balanced representation provides multiple levers for transformation towards sustainability including different sets of sustainability-aligned values.
- Values can be expressed explicitly and implicitly. Along with the influence of worldviews, languages, knowledge systems and power relations, value expressions are affected by the context in which decisions are made. Critical factors to consider include institutions, individual capacities and biophysical conditions.
- Valuation methods are based on different rules regarding who should participate, in what form values can be expressed and conclusions drawn. Hence, the type of methods used influences which values will be emphasized, how they are understood and expressed and consequently also the outcomes. Decision-makers may enhance the quality and relevance of valuation studies by searching for the method(s) that are best fit to the issue at hand (well established).
- Addressing knowledge (i.e., research, data) and operational (i.e., information, resources, capacities) gaps identified by this assessment can help make decision-making more rigorous, effective and ethical.

Relevant values-related policy themes and challenges

Diversity of values of nature and grassroot environmental movements: Grass roots efforts by Karuk tribal members were essential to convincing the company operating the dams on the Klamath River to begin a collaborative process to decide their re-licencing strategy. It was this collaboration that ultimately led to the Klamath Agreements and the plan to remove four of the dams on the river (Sarna-Wojcicki et al., 2019).

Rapid and/or large-scale land use transformations: The history of the Klamath River is one of large-scale land use transformations. The construction of the dams and drainage infrastructure by the US Bureau of Reclamation created approximately a hundred of thousand hectares of farmland in the upper Klamath Basin from non-arable swamps, lakes and high desert (Chaffin et al., 2019). The

hydroelectric power also provided inexpensive electricity to support the growth of farming communities in the region.

Agriculture and food production: The conflict on the Klamath was framed in terms of "fish vs. farmers" and pitted agriculture and food production directly against endangered species (Albertson 2019; Milstein, 2002: Levy, 2003; Doremus and Tarlock, 2003). The decision to deny farmers access to irrigation water resulted in $200 million worth of lost crops (Levy, 2003).

Unsustainable fisheries: The building of the dams and fishing practices during the 20th century off the coast of Oregon and California contributed to declines in salmon and steelhead resulting in the listing of numerous runs as either endangered or threatened (National Resource Council, 2004). These practices also reduced the availability of fish for sustenance and cultural use by native people's living in the basin (Sowerwine et al. 2019).

Description of the problem and how policy attempted to resolve it

The Klamath River Basin spans two U.S. States and is home to the Hoopa Valley, Karuk, Yurok, Resighini Rancheria, Quartz Valley Indian Reservation and the Shasta Indian Nation and Klamath Tribes (Whyte 2017; Norgaard 2019; Crawford 2015). It is the fourth largest river in the U.S. and one of the most productive spawning grounds for threatened and endangered Pacific Salmon in the country (Albertson, 2019; Chaffin et al, 2019). The Klamath River Basin is considered one of the most biodiverse regions in western North America, in part due to indigenous land management like cultural forest burning which helped produce and maintain the high biodiversity in the catchment (Mucioki, 2018; Sarna-Wojcicki et al., 2019; Crawford et al., 2015). The river experiences marked seasonal and interannual fluctuations in water and the water is shared between stakeholder including farmers, rancher, indigenous communities, fisherman, power companies, fish, wildlife and people who receive their drinking water from the system.

The history of the Klamath Basin is one of conflicting worldviews and values that have been inequitably represented because of power asymmetry between respective value articulating institutions (Doremus & Tarlock, 2003). Beginning with European colonization of the region which peaked with the imposition of "treaties" between indigenous people and the U.S. government, treaties that manifest the values and priorities of the government at the time (instrumental) and ignored or ran counter to indigenous values (relational) and world views (Norgaard, 2019; Sarna-Wojcicki et al., 2019). During the 20th century, dams and drainage infrastructure were built by the U.S. federal government to moderate water availability and support agricultural irrigation and energy production (Halleran, 2018; Chaffin et al., 2019). The hydroelectric dams blocked salmon passage and agricultural run-off reduced water quality (Chaffin et al., 2019; Levy, 2003) which in turn have impacted indigenous peoples' way of life, commercial fishing off the Pacific coast and populations of endangered and threatened fish and wildlife (Chaffin et al., 2019; Sarna-Wojcicki et al., 2019; Norgaard, 2019). The built infrastructure impowered institutions, like the U.S. Bureau of Reclamation, that were legally committed to top-down techno-developmental management of the watershed and a worldview view of nature needing to be conquered, contained and regulated to increase efficient production of commodity goods (Bureau of Reclamation, 2018). In the 1960s and 1970s U.S. public perception of the environment shifted and new laws like the Endangered Species Act, provided a leverage point with-in the top-down federal institutions for a limited set of other values—but not worldviews—to be considered (Doremus & Tarlock, 2003).

In early 2001 conflict between water users on the Klamath River erupted when a U.S. federal agency withheld irrigation water from farmers and rancher to protect endangered fish (Albertson 2019; Sarna-Wojcicki et al., 2019; Chaffin et al., 2019; Doremus & Tarlock, 2008) which resulted in more than $200 million in agricultural losses (Levy, 2003) and spurred organized protests leading to the illegal diversion of water to irrigate crops (Albertson, 2019; Chaffin et al., 2019). The crisis was

branded as a "water war" by the media and characterized as "fish vs. farmer" (Albertson 2019; Milstein, 2002: Levy, 2003; Doremus and Tarlock, 2003). The following year, the federal government decided not to withhold water from agriculture despite warnings from biologists from the Yurok and Karuk tribes warning of negative impacts on salmon populations. The result of holding water upstream for agriculture was the largest fish kill on record, costing fishing industries more than $80 million (Sarna-Wojcicki et al., 2019, CDFW, 2004; USFWS, 2003).

In 2006, the license to operate the dams on the Klamath river expired and under immense pressure from stakeholder groups, particularly grassroots indigenous protests, the company operating the dams launched a collaborative process to decide the future of the Klamath River (Albertson, 2019; Sarn-Wojcicki et al., 2019; Chaffin et al., 2019; Doremus & Tarlock, 2008). More than 140 stakeholder groups participated in the collaboration to produce the Klamath Basin Restoration Agreement, which includes the removal of some dams and maintenance of higher water levels in Klamath River (Biondini 2017; Doremus & Tarlock, 2008; Milner, 2015). The crisis provided an opportunity for collaborative, bottom-up value articulating institutions that allowed multiple values and worldviews, including IDK to be expressed. As a result, the crisis—while not resolved—was deescalated. Unfortunately, power asymmetries between top-down federal institutions and the newly formed collaboratives still exist and the U.S. congress failed to pass legislation to fund the original Klamath Basin Restoration Agreement leading to subsequent versions that have been stalled for years at almost every level of government (Chaffin et al., 2019). As a result, conflict over water in the Klamath River Basin continues and following drought conditions in 2021, new protests erupted over water use by farmers, environmentalists and Indigenous peoples.

Interlinkages with *Chapter 2,* chapters and the IPBES conceptual framework

Case study is directly referred to in *Chapter 2* sections related to diverse expression of value, including broad values and conflict therein, intrinsic, instrumental, and relational value; importance of plural approaches for decision making to shift the focus from what is valued to why and how it is valued in order to find common ground; and reference to the role of institutions in the articulation of value and to power relations and justice.

- Example of conflict between different worldviews, including reference to anthropocentric, biocentric and pluricentric worldview. Example of pluricentric worldviews
- Life frames. Convergence and divergence across different value frames. Example of how the life frame spotlight can illuminate possible the nature of the conflict and possible convergencies to address it. Example of overlapping between living from and living as frames in the relationships of the Karuk tribes and the salmon.
- The role of institutions in "articulating" values, including broader worldviews and human-nature relationships held by diverse stakeholders, including their capacity (or not) to resolve or avoid conflicts.
- *Chapter 4*: example of policy and decision making in a conflict situation. Role of treaties and policy agreements in practice
- *Chapter 5*: reference to environmental justice
- *Chapter 6*: role of grassroot movement, role of scholars in environmental conflicts, knowledge systems.

Main discussion points

- Conflict was initially de-escalated to a large degree when local stakeholders collaborated and negotiated solutions that accounted for the multitude of different ways that farmers, indigenous peoples, environmentalists and fishers related to and found fulfilment and identity in the Klamath region
- Different values, practices, and knowledge systems through grassroot actions addressed issues of distribution, recognition, environmental justice in the region across different stakeholders
- ILK knowledge and practices informed policies
- Institutions played multiple roles in the conflict (value articulating institutions such as economic CBAs) as well as asymmetry of power.

Figures

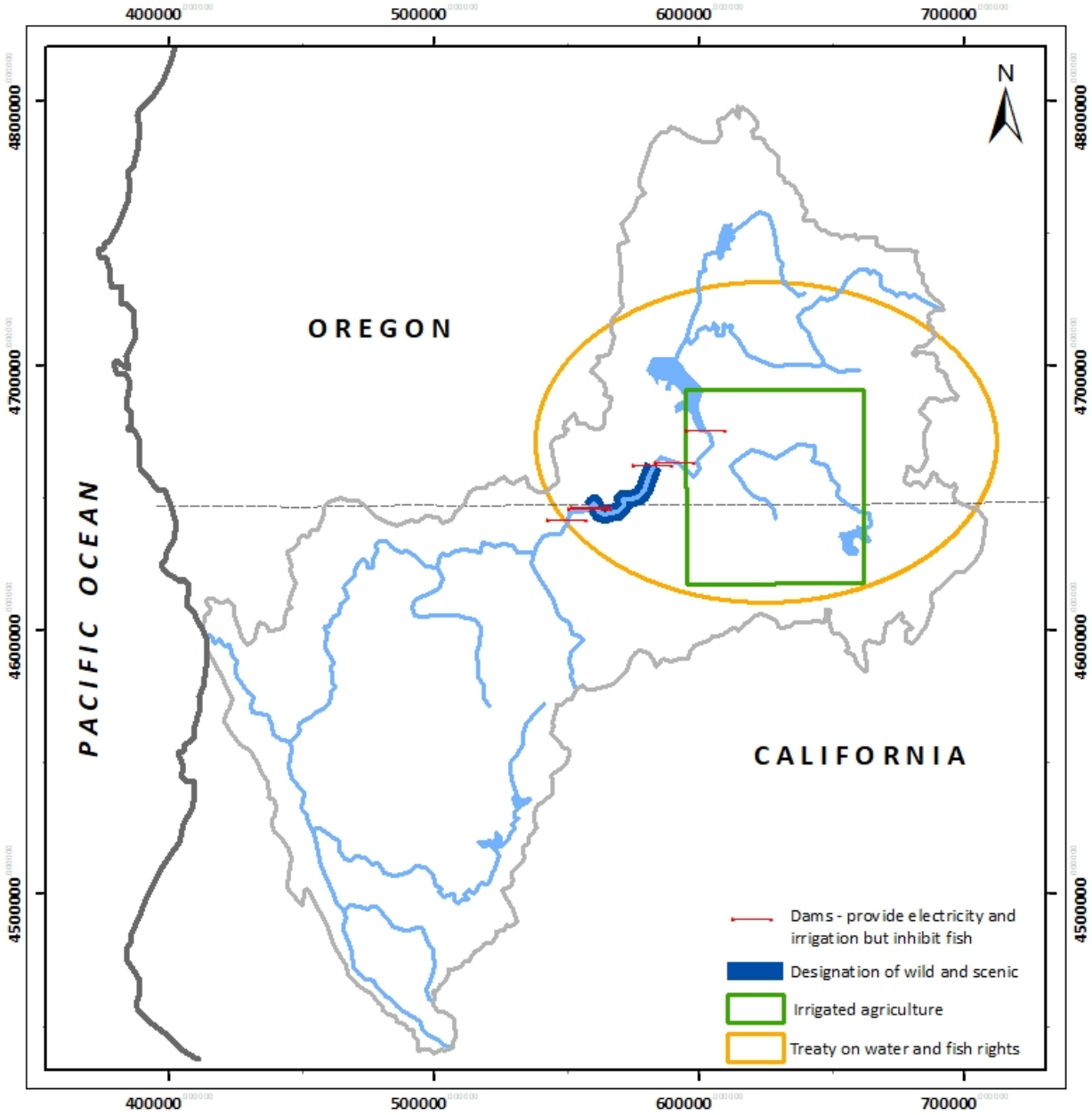

Figure SM2.5 Location of the case.

References

Albertson, Z. (2019). Constructing the Klamath: Nature, Culture, and the Management of a Western River. Society & Natural Resources, 32(7), 790–806. https://doi.org/10.1080/08941920.2019.1590670

Biondini, L. (2017). Salmon pluralities: The politics of commercial fishing on the Hoopa Valley Reservation. HSU Theses and Projects. https://digitalcommons.humboldt.edu/etd/108

Bureau of Reclamation. (2018). "The Bureau of Reclamation: A Very Brief History." Reclamation History, 2018. https://www.usbr.gov/history/borhist.html.

CDFG (California Department of Fish and Game). (2004). September 2002 Klamath River fish-kill: final analysis of contributing factors and impacts.

Chaffin, B. C., Craig, R. K., & Gosnell, H. (2014). Resilience, adaptation, and transformation in the Klamath River Basin social-ecological system. Idaho L. Rev., 51, 157.

Crawford, J. N., Mensing, S. A., Lake, F. K., & Zimmerman, S. R. (2015). Late Holocene fire and vegetation reconstruction from the western Klamath Mountains, California, USA: A multi-disciplinary approach for examining potential human land-use impacts. The Holocene, 25(8), 1341–1357. https://doi.org/10.1177/0959683615584205

Doremus, H. D., & Tarlock, A. D. (2008). Water War in the Klamath Basin: Macho Law, Combat Biology, and Dirty Politics. Island Press.

Doremus, H., & Tarlock, A. D. (2003). Fish, Farms, and the Clash of Cultures in the Klamath Basin. Ecology Law Quarterly, 30(2), 279–350.

Halleran, P. C. (2018). "We All Live Downriver": Environmental Justice and Community Resistance to the Pacific Connector Gas Pipeline and Jordan Cove Export Terminal in Southern Oregon. Masters Thesis. Oregon State University.

Levy, S. (2003). Turbulence in the Klamath River Basin. BioScience, 53(4), 315–320. https://doi.org/10.1641/0006-3568(2003)053[0315:TITKRB]2.0.CO;2

Milner, M. (2015). Water Law Meets Participatory Democracy: A Klamath Basin Example. Journal of Environmental Law and Litigation, 30(1), 87–142.

Milstein, M. (2002). The press portrayed the story as fish vs. Farmers. Nieman Reports, 56(4), 54.

National Resource Council, N., Studies, D. on E. and L., Toxicology, B. on E. S. and, & Basin, C. on E. and T. F. in the K. R. (2004). Endangered and Threatened Fishes in the Klamath River Basin: Causes of Decline and Strategies for Recovery. National Academies Press.

Norgaard, K. M. (2019). Salmon and Acorns Feed Our People: Colonialism, Nature, and Social Action. Rutgers University Press.

Sarna-Wojcicki, D., Sowerwine, J., Hillman, L., Hillman, L., & Tripp, B. (2019). Decentering watersheds and decolonising watershed governance: Towards an ecocultural politics of scale in the Klamath Basin. Water Alternatives, 12(1), 241–266.

Sowerwine, J., Mucioki, M., Sarna-Wojcicki, D., & Hillman, L. (2019). Reframing food security by and for Native American communities: A case study among tribes in the Klamath River basin of Oregon and California. Food Security, 11(3), 579–607. https://doi.org/10.1007/s12571-019-00925-y

USFWS (US Fish and Wildlife Service). (2003). Klamath River fish die-off September 2002, Report on estimate of mortality. Report Number AFWO-01-03.

Whyte, K. (2017). Food Sovereignty, Justice and Indigenous Peoples: An Essay on Settler Colonialism and Collective Continuance (SSRN Scholarly Paper ID 2925285). Social Science Research Network. https://papers.ssrn.com/abstract=2925285

Annex 2.7 Worldviews, policies, and knowledge systems

Worldviews categories and their representation on National Biodiversity Strategies and Action Plans (NBASPs)

Three categories of worldviews expressing human-nature relationships are most prevalent in the literature reviews done in chapter 2: Bio and eco-centric, anthropocentric and polycentric. Although there is a significant amount of variation and overlap within and between these categories, there are different implications for policymaking connected to each one of them. Here, we review how these worldviews were emphasized in the review of national biodiversity strategies and action plans conducted in *chapter 2*[5].

1. Bio- and ecocentric worldviews emphasize nature's inherent or intrinsic value, in terms of individuals (e.g., each organism/species) and collectives (e.g., ecosystems). Many national biodiversity strategies and action plans display some bio- and ecocentric orientations, such as India's recognition of the natural world's intrinsic value and the ethical need 'to protect all forms of life in various cultures', and Japan's biodiversity policy recognizes that biodiversity is important beyond its relation to humans, and in the face of frequent natural disasters, emphasizes respecting nature.
2. Anthropocentric worldviews prioritize humans, ranging from a narrow/strong human emphasis to weak/relational perspectives that do not deny others (Norton, 1984; Hargrove, 1992). Nearly all reviewed NBSAPs predominantly displayed weak anthropocentric worldviews, offering human-centred, instrumental motivations for protecting the environment and conserving biodiversity, but alongside a recognition of the interdependence between social and ecological systems. Stronger anthropocentric worldviews, however, can be found in other sectoral policy realms. For example, the report *State of Food and Agriculture 2019: Moving Forward on Food Loss and Waste Reduction* (FAO, 2019) is concerned with agricultural production and distribution, focusing specifically on reducing food loss and waste.
3. Pluricentric worldviews focus on relationships between humans and other-than-human beings, as well as nature's elements and systemic processes, conceived as reciprocal, interdependent, inter-twined and embedded (Matthews, 1994; Saxena et al., 2018; Gould et al., 2019). Pluricentric worldviews are mostly associated with relational values. These perspectives challenge the idea of a general classification of beings and their values to people (e.g., how people relate to or value animals or mammals in general) and replace it with the notion of a plurality of co-existing classifications, practices and understandings of the world (i.e., a world where many "worlds" can exist, de Castro 1998; de la Cadena & Blaser, 2018). For example, when the Lummi Nation in North America claims that orcas (*Orcinus orca*) are people and their relatives under the water, it is a representation of their world that might be different from other worlds.

[5] Analysis of national and international policy documents related to biodiversity and sustainability (https://doi.org/10.5281/zenodo.4399907).

Worldviews, knowledge systems and values

Worldviews are constantly interacting with knowledge systems. These include academic and non-academic knowledge systems. Academic knowledge tends to be expressed by scholarly fields, such as arts and humanities, social sciences, physical sciences and life sciences. Non-academic knowledge is mostly expressed through diverse indigenous and local knowledge systems held by indigenous peoples and local communities. The indigenous and local knowledge, and academic sources reviewed highlighted the place-based, and diverse nature of non-academic knowledge systems, especially, local and indigenous knowledge. In the values literature review (n=168 relevant to knowledge systems)[6], most papers represented academic knowledge, primarily western academic traditions (61%), followed by indigenous (10.7%), and local (6%), other Eastern knowledge systems (9%), which included Chinese, Indian, and Japanese, and a mix of different knowledge systems (13%). This finding highlights a clear gap of representation of non-academic knowledge in academic databases. In the ILK-focused literature review (n=150 articles), local (39%) and indigenous knowledge (30%) were almost equally represented, while the remainder of the articles focused on contrasting these two knowledge systems with academic knowledge.

Regarding values, an important difference among knowledge systems is whether values are seen as: (i) distinguishable, persistent, self-existent mental constructs (as is common in economics and social psychology) or (ii) dynamically constructed in-context (as is common in humanities, qualitative social sciences, and indigenous peoples and local communities (Kenter et al., 2019)). For example, exploration of knowledge systems among experts in this assessment revealed four different clusters with divergent views regarding knowledge validation and confirmation: (1) people embracing pluralistic views on knowledge and commitment to action-oriented science approaches; (2) people prioritizing the importance of theoretical verification, empirical observation and measurement; (3) people emphasizing multiple participants' meanings, social and historical construction and theory generation; and (4) people intending to achieve social transformation, politics, collaboration and justice (Hakkarainen et al., 2020). To address this complexity, plural value assessments require capacity-building in dialogue and negotiation between knowledge systems (Evely et al., 2008) and processes for articulating knowledge across stakeholders (Raymond et al., 2010; Reed et al., 2009; Tengö et al., 2017, *Chapter 6*). Secondly, knowledge-based views of values can influence how a policy problem is approached conceptually and methodologically. For instance, consideration of values as social constructs, rather than preformed and stable, may favour more participatory approaches (Irvine et al., 2016). Thirdly, power can be exercised by explicitly or implicitly privileging certain systems over others (Collier, 2009). As such, assumptions of the objective separation between nature and people are closely associated with the dominant framing of nature as a resource in science and policy, and with a conception of values as individual and instrumental. Consequently, knowledge systems and their associated institutions coexist with and shape worldviews.

The ILK-focused and the philosophies of good living literature reviews[7] conducted for this chapter revealed: (1) a polarization between ILK, academic knowledge and other knowledge systems; and (2) the dynamic and multifaceted spectrum of socio-cultural groups sharing similar or converging perspectives regarding the values of nature. These findings justify a call for a broadening of the scope

[6] Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).
[7] Literature review for the philosophies of good living ILK cross-assessment case study (cross-chapter/ILK) (https://doi.org/10.5281/zenodo.4399544).

of socio-cultural groups under the category of "local communities" to be inclusive of those who share a common identity or livelihoods attached to a specific place, ecosystem, or natural resources. An exploratory analysis conducted in the ILK-focused literature review revealed that the category of "local knowledge" was inclusive of a great variety of social actors, ranging from artisanal fishers (e.g., in Ireland, England, Brazil, etc.) to farmers (e.g., in Argentina, Peru, England, Italy, Spain, Benin, etc.), mountain-based communities (e.g., in Austria, France, Switzerland), coastal communities (e.g., in Madagascar, Fiji, Estonia, Chile, Vietnam, Puerto Rico, Kenya, Vanuatu, Colombia, etc.), rural communities (e.g., in Mexico, India, Spain, Canada, Germany, Congo, Morocco, Namibia, Tanzania, Ecuador, US, etc.), forest-based communities (e.g., in Indian Himalayas, Cameroon, Guatemala, Madagascar, Tanzania, Indonesia, Laos, Ecuador, etc.) urban communities and contexts (e.g., in Iran, Finland, Nigeria, Ireland, etc.), sacred landscapes (e.g., in China, Rwanda), Arctic residents, and watershed protection groups (e.g., in the US).[8]

[8] Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

References

Collier, S. J. (2009). Topologies of Power: Foucault's Analysis of Political Government beyond "Governmentality." *Theory, Culture & Society*, *26*(6), 78–108. https://doi.org/10.1177/0263276409347694

de Castro, E. V. (1998). Cosmological Deixis and Amerindian Perspectivism. *The Journal of the Royal Anthropological Institute*, *4*(3), 469. https://doi.org/10.2307/3034157

de la Cadena, M., & Blaser, M. (2018). *A World of Many Worlds*. Duke University Press. https://books.google.de/books?id=ptpyDwAAQBAJ

Evely, A. C., Fazey, I., Pinard, M., & Lambin, X. (2008). The Influence of Philosophical Perspectives in Integrative Research: A Conservation Case Study in the Cairngorms National. *Ecology and Society*, *13*(2).

Gould, R. K., Pai, M., Muraca, B., & Chan, K. M. (2019). He 'ike 'ana ia i ka pono (it is a recognizing of the right thing): How one indigenous worldview informs relational values and social values. *Sustainability Science*, *14*(5), 1213–1232. Scopus. https://doi.org/10.1007/s11625-019-00721-9

Hakkarainen, V., Anderson, C. B., Eriksson, M., van Riper, C. J., Horcea-Milcu, A., & Raymond, C. M. (2020). Grounding IPBES experts' views on the multiple values of nature in epistemology, knowledge and collaborative science. *Environmental Science & Policy*, *105*, 11–18. https://doi.org/10.1016/j.envsci.2019.12.003

Irvine, K. N., O'Brien, L., Ravenscroft, N., Cooper, N., Everard, M., Fazey, I., Reed, M. S., & Kenter, J. O. (2016). Ecosystem services and the idea of shared values. *Ecosystem Services*, *21*. https://doi.org/10.1016/j.ecoser.2016.07.001

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. K., Ives, C. D., Hejnowicz, A. P., Gunton, R., Horcea-Milcu, A.-I., Kendal, D., Kronenberg, J., Massenberg, J. R., O'Connor, S., Ravenscroft, N., … Et al. (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

Matthews, F. (1994). *The Ecological Self*. Routledge.

Raymond, C. M., Fazey, I., Reed, M. S., Stringer, L. C., Robinson, G. M., & Evely, A. C. (2010). Integrating local and scientific knowledge for environmental management. *Journal of Environmental Management*, *91*(8), 1766–1777. https://doi.org/10.1016/j.jenvman.2010.03.023

Reed, M., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C. H., & Stringer, L. C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, *90*(5), 1933–1949. https://doi.org/10.1016/j.jenvman.2009.01.001

Saxena, A. K., Chatti, D., Overstreet, K., & Dove, M. R. (2018). From moral ecology to diverse ontologies: Relational values in human ecological research, past and present. *Current Opinion in Environmental Sustainability*, *35*, 54–60. https://doi.org/10.1016/j.cosust.2018.10.021

Tengö, M., Hill, R., Malmer, P., Raymond, C. M., Spierenburg, M., Danielsen, F., Elmqvist, T., & Folke, C. (2017). Weaving knowledge systems in IPBES, CBD and beyond—Lessons learned for sustainability. *Current Opinion in Environmental Sustainability*, *26–27*, 17–25. https://doi.org/10.1016/j.cosust.2016.12.005

Annex 2.8 Interconnections between languages, biodiversity and values

Objective: This effort is aimed at getting a deeper understanding of the connections or nexus between languages, values, and biodiversity, and the policies that exist or could be developed to support these connections. Despite the robust evidence that exists documenting the connections between linguistic and biological diversity, we identified a gap of knowledge connecting languages, values, and nature. This is relevant to the values assessment in general and to *Chapter 2's* mandate, which is to describe the diverse conceptualizations of values of biodiversity and nature, and how these are expressed, communicated and articulated in decision and policy-making.

Methods: A protocol for collecting information provided by language specialists and ILK holders was developed by *Chapter 2* ILK team. An initial list of 44 experts representing different world regions was compiled based on UNESCO's ILK task-force database. These experts were ranked based on level of desired expertise and geographic coverage. From the initial list, 16 experts were contacted, from which 10 agreed to collaborate with this effort. Contributing authors sent their individual contributions in the protocols provided, which were synthesized on the Table presented in this Annex, and used in *Chapter 2*. The full protocols are included in the languages data management report[9].

[9] Analysis on contributions on interconnections between languages, biodiversity and values (https://doi.org/10.5281/zenodo.4399917).

Table SM2.5 Synthesis of contributions from languages specialists on the interconnections between languages, biodiversity and values.

Country/ region	Contributing author/ language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Australia	Jane Simpson Warumungu (around 320 speakers)	Pama-Nyungan	Language is a tool for naming and categorizing nature as well as remembering the elements of nature, which are important to a particular group	The main driver for the loss of language is changes in lifestyles	Habitat-based classification expressed through the suffix '-warinyi'. All 'dweller' of a particular habitat (e.g., plants, animals, humans, etc.) have equal rights.	When communities do not have access to their traditional livelihoods, the language associated with those livelihoods tends to erode	Colonization, inability to maintain traditional lifestyles, preference for lingua franca, governmental policies	Establishment of language centres, development of learning materials for children, teaching in Warumungu language, using Warumungu language on street posts and signs	Lack of comprehensive language support policy, lack of secure funding
Hungary	Kinga Magdolna Mandel Hungatin /approximately 13 million speakers	Uralic (Finno-Ugrian)	Language shapes, who we are and how we think about ourselves and the world around us	Loss of language may result in erosion of innovative potential and centuries-old knowledge	Not mentioned	The erosion of language is part of the erosion of values	Banning and feeing the language usage, fear to speak, the economic devaluation of the language	Institutionalization of language rights, language usage in schools, cultural and other institutions, official and unofficial spaces, economic incentives for using a language.	Lack of consensus on European level, lack of enforcement and poor policy implementation.

Table SM2.5 Continuation

Country/ region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Ghana, Burkina Faso and Togo	Hasiyatu Abubakari, Adams Bodomo and Samuel Isaah Dagaare, Dagbani and Kusaal dialects of Mabia (from 500 k to 2 million speakers)	Niger-Congo	Languages reflect how speakers think about the environment around them. Mabia languages transmit values related to biodiversity through folktales, proverbs, songs etc. Almost 60 to 70 percent of proverbs make refence to one animal or another, a tree, or other nature elements	Loss of language leads to erosion of taboos, beliefs and cultural notions that protect environment.	Water bodies are seen as deities, while the aquatic species are the "children" of those deities. These species are under protection. Trees are compared to chiefs. Taboos for falling trees. Bɛ bi ŋmaari ti-wala means: “They do not fell a tree that bears fruits”. Bɛ bi sibigiri tia ka sari tia: They do not uproot a tree and plant another one.	The loss of language will lead to erosion of conservation values, rules, and taboos contained in the folk tales, proverbs, etc. It is difficult to understand the layered meanings of these tales without a good command of language.	Not mentioned explicitly	Academic research and documentation, promotion of teaching in local languages in primary schools.	Lack of support for comprehensive research and documentation.

Table SM2.5 Continuation

Country/ region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Russia, Eastern Siberia	Alexandra Lavrillier Evenki and Even/ approx. 7-10,000 speakers	Manchu-Tungus	Language is a repository of knowledge about the environment, its functions, human-nature relationships as well as rules of interacting with nature and codes of behavior.	Loss of language leads to erosion of the repository of local knowledge about species, taxa, etc.	"Buga" is a concept that carries a meaning of the biophysical environment and the spirits inhabiting it; Buga is seen also as a spiritual entity governing the entire natural environment.	Erosion of language leads to the weakening of the rules of "proper" behavior in nature.	change of lifestyle (from nomadic to sedentary and urbanized)	Keeping the nomadic lifestyle, governmental support.	Lack of funding, lack of governmental support, lack of books and e-learning tools, etc.

Table SM2.5 Continuation

Country/ region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Brazil, Amazon	Hein Van der Voort Aikanã/ around 250 speakers	linguistic isolate	Elders pass on knowledge of language and through the language to the younger generations.	The same drivers lead to the loss of biodiversity as well as local languages.	Learning from animals: a general theme frequently observed in myths is the notion that the Aikanã had originally learnt from the animals all that is necessary for subsistence, such as hunting, making a swidden field, building a house, manufacturing objects, etc.	Aikanã worldviews and values are expressed especially in traditional beliefs and mythology, which are recounted only in the indigenous language.	Displacement of Aikanã people from their traditional lands, assimilation policies backed by the government.	Parents speaking a language in the family, documentation and research efforts, revitalization programs. Another crucial factor is the integrity of the community and their lands. Subgroups of the Aikanã that have been displaced since the 1940s have lost the language, but in the indigenous reserves in the original region in southeastern Rondônia, the language is very much alive.	Political changes leading to weaker support for local languages.

Table SM2.5 Continuation

Country/ region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Perú, Ucayali	Ana Carolina Rodríguez Alzza Iskonawa, around 25 speakers	Pano	The Iskonawa since contact (~1959) had suffered a complex process of deterioration and change (violent history of contacts with Westerners). This language is in an extinction stage, counting with less than (self-reported) two dozen of speakers (in 2017).	There are just 5 elders considered fluid speakers while less than 25 speakers are counted as somehow knowledgeable of this language.	Not mentioned	The Iskonawa knowledge of their traditional territory and biological diversity is held by a few elders that speak the language. Younger generations assimilated the Shipibo-Konibo knowledge-language of their current geographical area. There is an overlapping of lexical terms in Shipibo and Iskonawa of similar bio and ecological systems.	The vulnerability and erosion of Iskonawa language and culture, is linked to the erosion of their values and recent history of violent contacts with Peruvians and Brazilians; contagious diseases; migrations to other places, forcing them to "live on the run".	Several efforts to document and support language revitalization have been underway since 2013 through partnerships with academic institutions, including recording of linguistic materials available in archives and repositories*. Since 2017, Iskonawa youngsters are enrolled in the intercultural bilingual education program, and the Peruvian government has supported additional efforts through specific policies and incentives.	1. Number of speakers (~25), 2. linguistic discrimination, 3. self-censorship, 4. assimilation of the language a stronger and bigger Amazonian group whose territory is now the home of the Iskonawa (Shipibo-Konibo) .

Table SM2.5 Continuation

Country/ region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Mexico	Araceli Torres Morales Tu'un Javi (word of the rain), also known as Mixtec in Spanish, around 517,665 speakers	Oto - mangue	Mixtec language is our identity, a powerful tool to rediscover human-nature ties and reconnect with our surroundings with values such as respect and care. 3. the possibility to generate links of respect and equity with our "Nanao ñu´u" "Our mother" and our understanding of the wind and water responses to each "yoó" (moon).	There is a discontinuity of teaching the language to the more recent generations which in turn affect practical issues to implement TEK (Mixtec language codes 7 kinds of rain). Youngers would lose the respect and wisdom of our elders and ancestors towards our territory, and the result would be devastating.	Nature and humans are one and the same in Mixtec's horizontal worldview. Parts of humans, plants and animals are named by the same lexeme. We take care of the Earth with respect and reciprocity and gratitude. Before plowing, we throw water and say: "Ni ko nanao ñu´u tacui chi shea na sasa´o" (let our Mother drink first since she gives us to eat").	Once a person forgets his/her indigenous language they no longer care for biodiversity and reciprocal care. We must return to our languages and retake the care towards our Mother Earth, especially now that we are living now a climate emergency. Language is the most tangible tool of knowledge, our ancestors' wisdom is coded in our language, the essence of existence.	Historical discrimination, and assimilation. Domination of Spanish as the official language, with past prohibition of the use of Mixtec. Forgetfulness and shame of ethnic origin. Migration, for lack of economic opportunities that leads to forgetting the language, as well as racism and prejudice.	At the national level there is the General Law of Indigenous peoples Linguistic Rights. The INALI (National Institute of Indigenous Languages) supports programs for the use and development of indigenous languages. At the local level, communities have implemented strategies for language revitalization including creation of videos, digital apps and tools to learn the language. Training youngster to be translators in legal settings.	Overcoming racism and discrimination towards indigenous peoples. Power imbalance and Spanish supremacy. Unfulfillment of law that protects indigenous language. Lack of recognition of Indigenous rights, which include linguistic rights. Lack of national and local broadcasting about the General Law of Indigenous Peoples Linguistic Rights.

Table SM2.5 Continuation

Country/ region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Venezuela / Amazon	Eglée Zent Jotï / Jodï / Jotö	Salivan	Language is a first media to express, transmit, store and increase the knowledge about life, its dynamics and functions, including all that is valuable, important or dangerous.	The total Jotï population is less than 2000 people. 100% of the Jotï are fluent speakers of their language, with about half monolingual. The Jotï are vulnerable given that they are facing diverse real threatens (security, health, territoriality, mining, colonization, etc.).	The Jotï do not have a word for nature, their cosmos is understood better as a sphere of life or biosphere populated by numerous entities besides humans. Their dynamic cosmos includes: the active fabrication of both forests and bodies which underlie their philosophy jkyo jkwainï: *to care for everyone and everything that surrounds oneself.*	There is no effective way to transmit the rich philosophy of Jotï life in another linguistic code or language. If the language is lost, the wisdom and real praxis will suffer in a meaningful sense. Ethics and proper ways to be in the world are encapsulated in their language.	Biological threats: violence, mining, diseases, no access to health facilities, etc.; and cultural threats: assimilation, racism, discrimination, appropriation, etc.	Venezuela have National laws that protects indigenous people and languages and is signatory of international policies that in theory protects indigenous peoples. In practice, they are not enforced or even known. The efforts and policies are left to the people themselves, who have strived to record their oral traditions, values, customs and way of life in visual, audio and written ways.	Biological and cultural survival of the group, and with them, the maintenance of their language, livelihoods and worldviews.

Table SM2.5 Continuation

Country/ region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Brazil, Amazon	Bruna Franchetto Kuikuro (Kuhi ikugu, 'Needle Fish Creek')/ Around 600 speakers	Carib	Language is the most important mean for conveying, transmitting knowledge from one generation to the next, and preserve values, oral history and a rich and complex knowledge of biodiversity and the environment.	Not mentioned	Each other-than human living being, including plants, is defined with its associations to mythical narratives, micro-environments, its use and restrictions, social values and meanings. Each tree has its own oto (master), an itseke (spirit, hyper-being). Some big and valued trees are tüngonginhü: they are powerful itseke, who can cause illness and even death for those who do not approach them with due care.	Lexicon impoverishment leads to the loss of terms and all the knowledge and values associated with them. The names and identification of many plants used in traditional medicine are being rapidly loss. The chain of knowledge transmission between older and younger generations is broken.	Conflict and power imbalance between the Indigenous language and the dominant language (Portuguese) in schooling, and growing presence of media and television. Increased people's mobility between villages and towns. Contact with missionaries, and COVID-19 (elders are a risk group).	Teaching of indigenous languages schools and Universities. Production of written materials for literacy on traditional knowledge. Incentives for production of films in indigenous languages. Creation of radio and television media in indigenous languages. Support for indigenous and non-indigenous researchers. Creation of indigenous languages documentation. Publication of research results for the public.	In Brazil, there is no explicit and articulated governmental policy for Indigenous languages. Unfortunately, much of what has been defined in laws and other administrative measures has not left paper and official rhetoric and has not reached indigenous schools, with a few exceptions.

Table SM2.5 Continuation

Country/ Region	Language(s)/ number of speakers	Language family	Role in forming and transmitting biodiversity-related values	Loss of language and its impact on ILK	Concepts for worldviews and values	Links between the erosion of language, values, and biodiversity	Drivers of language loss	Efforts, actions and policies for supporting a language	Challenges
Spain, France	Dylan Inglis Basque (Euskara) 750,000 bilingual Basque-speakers + 435,000 passive bilinguals	Language isolate	Euskara has been a vessel for inter-generational knowledge transmission and interlinks between nature and culture in the region since pre-Roman times. The language remains intimately connected with the regions where spoken, and feelings of place attachment and cultural identity – both key relational values about local nature – are deeply informed by an intimate relationship with Euskara.	Rich lexicon about local biodiversity and knowledge about diverse uses of plants and animals are mostly possessed by older Euskara-speakers living in rural areas. Non- or incomplete transmission of the language comes with loss of this knowledge and resulting alienation from local nature.	Although proto-Basque probably did not have equivalents for the Latin borrowings 'nature' and 'culture', Western dualisms are now well-integrated into modern Euskara. However, recent research on local value systems about Basque forests suggests that Euskara itself could constitute an important concept in relations with nature. As relationally linked to person, community, place and nature, the language informs peoples value preferences and interpretation of their connection to their locality.	Decline of traditional lifestyles and uses of the language and faltering community transmission of Euskara leads to loss of the parts of Basque lexicon that historically developed to allow speakers to precisely identify and understand local biodiversity. The break in community transmission of tales and fables about local life and Basque mythology, which were best maintained in Basque-speaking regions, also weakens connections with the surrounding living environment.	Use of Euskara has historically been prohibited in schools and stigmatised in society. At present, in France the language is excluded from most public education and state media. In Spain, Euskara enjoys co-official status and priority in public education, but even in Basque-speaking heartlands, the prevalence of French and Spanish on social media and television has a detrimental impact on language-use.	Most schooling in the Spanish Basque country is now in Euskara, and there are a growing number of privately-funded Basque-medium schools in France. Basques are dynamic in cultural activism – e.g., in 2019, 230,000 Basque speakers participated in a 2-week social experiment to increase their day-to-day use of the language. There is Basque-language written press, radio and television, and dozens of local radio stations. Proficiency in Euskara is required for public jobs in most of the Spanish Basque country.	The loss of inter-generational transmission is the key problem in France, while the gap between knowledge and use of Euskara is a key challenge in Spain. Euskara remains a socio-cultural and political topic, with little recognition of its potential links with nature. Yet in an increasingly post-materialist society, relations between values about Euskara and nature must be better reflected in policy. This links the parallel movements for biological and linguistic diversity in a dynamic bond which highlights the interweaving of relations with and through language, culture and nature

Annex 2.9 Languages, values and territory among the Maskoke in the Ecovillage Community Land

Marcus Briggs-Cloud is a Maskoke (also named Muscogee) spiritual leader and scholar engaged in language revitalisation efforts for over 10 years in the US states of Florida and, more recently, Alabama, where he, along with a group of Maskoke, established the Ekvn-Yefolecv Maskoke Ecovillage. Marcus argues that efforts to save vanishing languages among indigenous peoples need to adopt a holistic relational approach, aimed at restoring the connections between people to their land and biodiversity. In his own words:

> *'I used to think that the most critical issue Maskoke People face was language loss as our ancient, yet threatened, language was projected to fall silent by the year 2040. I thought language revitalisation was the sole work to be done to restore wellness among our Maskoke People. That monolithic thinking came to an abrupt halt upon awakening to the reality that efficacious language revitalisation work is contingent upon numerous interconnected factors that address systemic issues through a holistic lens. In order to see a real reversal of language loss, we have to altogether change the way we live*'.

The grammatical structure of Maskoke is a product of a cultural evolutionary history that coincides with evolving community spiritual dynamics in a particular place. This linguistic transformative process also takes place in a co-evolutionary manner within localised ecosystems where Maskoke people are integrated. Examples of this are found in worldwide lexicons that illustrate onomatopoeia derived from species mimicry. For example, the Maskoke word for a whip-poor-will is *cokpelapela*, which is a syllabic reproduction of the bird's call. Looking beyond mere linguistic ecological parroting, the aforesaid linguistic evolution can be illustrated through analysis of etymological correspondences between the Maskoke words *vhakv*, interpreted as "law," and *vhake*, referring to a copy or imitation of something. Grammatically, the terms *vhakv* and *vhake* are derivative of the infinitive verb *haketv*, which means 'to become.' They descend from the same philosophical source, that is the natural order. Possessing only one different letter (the final letter), both terms are ecological in origin. Maskoke cultural "law" emerges by way of replicating phenomena in the natural order within the contiguous Maskoke bioregion, hence derivation from the word *haketv* "to become [like the natural world]". The word *hake*, in its autonomy, conjures an active verb mode of mirroring another entity, whereas uttering its nominalised form *hakv* converts the meaning to elucidate a societally solidified perception of the biogeographical ecosystem. The first letter 'v' serves as a locative prefix marker, placing the noun vertically in attachment to another entity. Thus, in this case, abidance of *vhakv* (law) means to attach Maskoke people to the bioregional natural order through obligatory observance and imitation of local non-human ecology. Maskoke people then implement and promulgate, in worldview and praxis, cultural regulations based on observed natural order.

It is argued that to restore biocultural connections that have been lost among the Maskoke, traditional livelihoods and values also need to be restored, through knowing how to grow heirloom corn and pumpkins, participate in daily activities and rituals, and invest in women as key agents in intergenerational language transmission.

Annex 2.10 Environmental value types

Values can be embodied or explicitly expressed

Values can be articulated in many different ways and languages (Martinez-Alier, 2001, 2009), ranging from narratives (e.g., stories about a landscape or a place – (Drenthen 2009), performances, practices, art (e.g., landscape paintings Klaver, 2012); writing about 'nature' – (Murphy et al., 1998) to more explicit articulation expressed in decision-making processes, as preferences and judgments as well as in other formal valuations and appraisals that inform collective decisions (Centemeri, 2015).

Most values, however, are only partly articulated, but they still play a crucial role in day-to-day life actions, practices, rituals and choices and in material culture. Because these values are constituent parts of what makes up who people are and how they understand themselves (Drenthen, 2009; Whyte, 2018b), they are often embodied rather than clearly articulated, although articulation and embodiment move on a continuum and are not reciprocally exclusive (*Figure SM2.6*). To say that values are embodied means that often human-nature-relationships that matter to people are manifested in their bodily abilities, practices and behaviour (Brennan, 2018) and through feelings (Bannon, 2016). This becomes particularly clear in perspectives of IPLC, in which the embodiment of values can be almost literal such that something of value becomes a literal part of a person or collective to the point that it is difficult to conceive of it or express it in terms independent of that person or collective (Cooke, et al., 2016; Descola, 2012; Escobar, 2008; Heft, 2001; Ingold, 2011; Jackson & Palmer, 2015; Raymond et al., 2018a; Zent, 2014a, 2014b; Ingold, 1995). Anthropology scholars refer to embodied practices under different labels (Aparicio, 2015; Belaunde, 2005; Londoño, 2003; Storrie, 1999; Vilaça, 2008; Zent, 2008; Århem et al. 2004). For the Jotï (Amerindian people living in the Amazons) the interdependence between people and the forest is literally and materially inscribed in their bodies via interpenetration with organic essences directly associated to the endless transformation of entities (Zent, 2013; Zent, 2013). The Anishinaabe people, originally inhabiting the Great Lakes region of North America "were literally cell by cell composed of the lake and the lake's islands" (Erdrich, 2006, Bujis, 2009).

There are many examples of values manifesting in direct embodiment related to the concepts of embodied cognition, embodied experience, dwelling in the biosphere, and embodied resistance (Chemero, 2009; Cooke et al., 2016; De la Cadena, 2019; Ingold, 2011; Raymond et al., 2018b; Whyte, 2018a, 2018c; Whyte, 2018; Zent, 2014a, 2014b). Feelings like grieving or mourning for the loss of relationships to place, landscapes, and nonhuman kin remain often unarticulated (Cunsolo & Landman 2017; McIntosh, 2004). Embodied values can sometimes be partly articulated, for example through story-telling, but equivocation remains as a constant possibility (de la Cadena, 2015; Viveiros De Castro, 2004).

The relevance of embodiment in environmental literature is applicable to human practices besides IPLC. For example, recent developments in cognitive and behavioural sciences have employed the 4E approach focusing on Embedded, Embodied, Enactive and Extended accounts of cognition (Newen et al., 2018). The ways in which people think and behave are influenced by the ecological niche they are situated in (Embedded), the ways through which they value and selectively engage and construct the environment they live in (Enacted), as well as by their evolved and developed bodily and perceptual capabilities (Embodied). In these perspectives, behaviour and cognition are understood as a coupled system consisting of both the organism and the environment (Chemero, 2009; Newen et al., 2018; Raymond et al., 2018b).

Box 2.16. Example of embodied values: Marisol de la Cadena on resistance against mining in a lagoon in the northern Andes in Peru.

The description refers to an environmental activist, Máxima, who refuses to sell and abandon her plot to a mining company: "She stays because she is by staying; that this reads like a redundancy marks the agrammaticality of the woman's decision. When I asked why she stayed (as many others have done before me, and I am sure after) she replied: 'What can I be if I am not this? [And the word 'place' is not uttered—instead feet are stomped.] This is who I am, how can I go? I will die [the word 'here' is not uttered] who I am, with my bones I will be [once again 'here' is not uttered] like I am now" Of course we can read her sentences through a habitual subject and object grammar—which I have suggested with the words in brackets; but the need for the brackets—the non-utterances in Máxima's answers are not 'blanks to be filled'—also suggest that there is not only one grammar to her refusal to sell the land which the mine wants." Marisol de la Cadena also refers to the complexity of inhabiting different worlds at the same time (Máxima claiming the property of her land in court while using a different language to express the embodied relationship to the land) (De la Cadena, 2019).

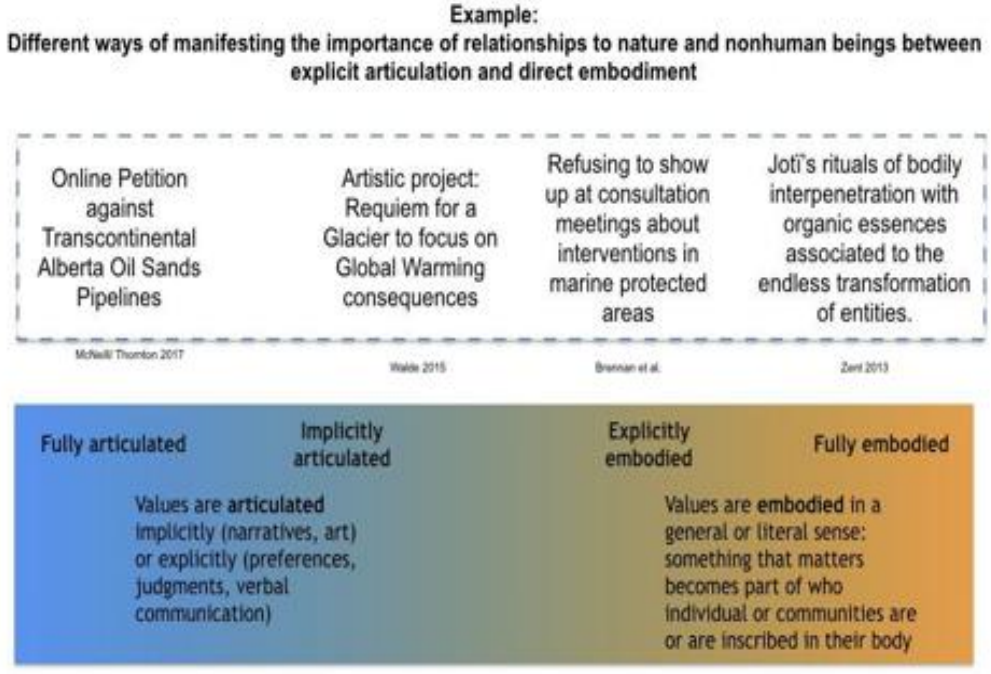

Figure SM2.6 How values are manifested on a gradient between being fully and explicitly articulated and directly inscribed in people's bodies.

Why value manifestation matters for environment policy and decision making

Embodied values are important in relation to policy, because unless embodied relationships are understood, they cannot be included in decisions. This means that some process of translation may be required where means are found to articulate their importance. Some forms of value manifestation can be hindered or neglected by valuation methods resulting in inaccurate mapping of environmental conflicts and policies that miss the target (Brondizio et al., 2010). Valuation methods that focus on a narrow range of value manifestations (for example articulations through individual preferences) risk under-representing the variety of values in conflict situations where there is high system complexity and a diversity of value languages (Frame & O' Connor 2011; TEEB 2012; NEA 2014). Since value manifestations often reflect social and cultural differences, less plural valuations can perpetuate power inequities and social injustice (Arias-Arévalo et al., 2018; Brondizio et al., 2010; Himes &

Muraca, 2018a; Popa & Guillermin, 2017). Importantly, people can express values precisely by the act of not articulating them. For example, in the Scottish Outer Hebrides, local communities opposing a marine protected area because they felt their local embodied knowledge and values were not considered, vis a vis technical assessment, expressed their values by refusing to show up to consultation meetings (Brennan, 2018).

Yet, there are methods that can help represent diverse forms of value manifestations and make them visible and relevant for policy makers. For example, methods employing art (such as art-led-dialogue or visualization methods) can help understanding the nature of specific environmental conflicts, as in the case of the conflict between biodiversity conservation and community interests in the Caledonian Forests, where a feasible path for ecocultural restoration is identified (Edwards et al., 2016) or help the dialogue across different systems of knowledge and experiences on pollinators through a walking workshop approach (Malmer et al., 2019). In cases with high system complexity and diverse value manifestations, pluralistic approaches, including deliberative methods, could help represent more adequately environmental conflicts, priorities, and meanings, and offer a more accurate basis for decision making processes. As most embodied values are shared, such approaches would be more likely to use social, participatory and ethnographic rather than individualistic analytical valuation approaches (Kenter et al., 2014).

Considering diverse values can help policy makers by making otherwise neglected, non-tangible costs and benefits visible (Witt et al., 2019), facilitating a more inclusive and just articulation of values (Himes & Muraca, 2018), clarifying, reducing or avoiding conflicts by fostering co-management (García-Llorente et al., 2018) and participation among different stakeholders (Gale & Ednie, 2019; Arias-Arévalo et al., 2017; Berry et al. 2018; Reed & Ceno, 2015), and increasing the acceptability of environmental interventions through better communication (Hope & Jones, 2014; Witt et al., 2019). It can strengthen motivations of people towards conservation (Winkler & Hauck, 2019), enable better collaboration across disciplines (Chan et al. 2018) and support broad alliances for win-win solutions (Reyers et al., 2012). Widening the perspective beyond instrumental or intrinsic values to include relational values can help highlight non-quantifiable aspects and non-commensurable values and ultimately lead to more effective, inclusive and fair outcomes (Jacobs et al., 2016; Kohler et al., 2019). More pluralistic value assessments reduce the risk of crowding out other motivations and helps build common ground and reciprocal learning across different stakeholders by acknowledging different reasons and motivations (Rico García-Amado et al., 2013). The *Buen vivir* concept exemplifies the articulation of indigenous philosophies and relational values in local and national policy-making in South America, which also has connections with Rights of Nature conceptualisations and policies.

Despite its relevance to decision and policy-making, pluralistic values assessment can be more complex and require more resources (*Figure SM2.7*). It may also require institutional capacity building (*Chapter 6*). Key situations where the assessment of plural values is likely to lead to more robust decisions include highly complex, uncertain or contested decision contexts and decisions with diverse stakeholders. Monistic approaches are likely to be effective in low-complexity situations with limited divergence among stakeholders (UK NEA 2014; Kenter et al 2014).

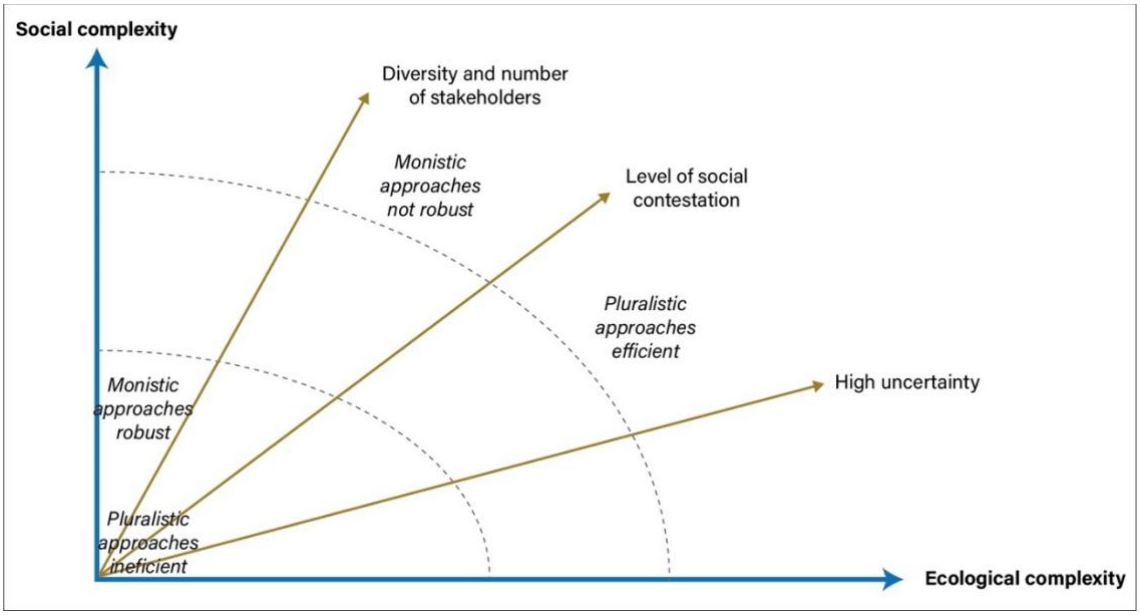

Figure SM2.7 Key factors influencing the relative robustness and efficiency of more monistic and more pluralistic approaches (based on: Frame & O' Connor, 2011; Kenter et al., 2014; UK National Ecosystem Assessment, 2014).

Box 2.17 Example of embodied values community voices of the value of the sea, United Kingdom

The countries of the UK have an extensive and diverse coastline. The sea and coast are central in the countries' cultural history and identity as a maritime nation, play an important role in many people's quality of life, and continue to provide important material and non-material contributions to local people including diverse identities and livelihoods. Its coastal and marine ecosystems, inshore and offshore, are under pressure from industrial developments such as renewable energy, aquaculture, aggregate extraction. Though some are recovering, many fish stocks continue to be depleted and their management (and who should manage them) continues to attract fierce debate, particularly in the context of the UK leaving the European Union. There has also been an intensification of policy efforts at managing marine ecosystems, its services and values, including through ongoing designation of a large number of marine protected areas and the introduction of national and regional marine plans to balance conservation and sustainable use according to principles of the Ecosystem Approach and in relation to SDG 14. These processes put increasing emphasis on the inclusion of local knowledge and values.

A recent novel participatory mechanism has been developed in collaboration between researchers, local decision makers and national and community stakeholders, titled the Community Voice Methodology. Originating in the developing world (Cumming and Norwood, 2012), the two stage 'interpretive-deliberative' approach (Ranger et al., 2016) compiles local knowledge and values through ethnographic video interviews that are compiled in a documentary film to reflect diverse voices in balanced way, which are then debated in deliberative workshops that focus on the translation of local knowledge and values into policy and management. Crucially, the approach provides an avenue where expert and local knowledge is put on a par and where less powerful voices are heard and provided a way to voice their values and influence decisions (Ranger et al., 2016). The approach has been applied to protected area management, fisheries management, understanding people's well-being in intertidal zones, underwater tourism, and integrated marine policy and diverse community voice projects are generating an extensive data set of compiled material. Diverse community members express different ways of relating to nature and framing the sea, and the qualitative narratives provide an insight into how local people express values across different dimensions. IPBES experts hope to analyse this secondary data to better understand different Life Frames of why the sea matters and how people relate to and value the sea and coast, including the interrelations between broad and specific values and instrumental, relational and intrinsic values. The ethnographic material also provides an avenue to explore how local people can articulate embodied values.

Values of and about nature can be broad or specific

Broad values

Broad values include moral principles but also other life goals, such as life enjoyment, health, wealth, etc. They are central to cultures and they guide more specific values related to particular situations. For example, the Oromo people of Ethiopia adhere to the principle of Saffuu, which guides people's lives, impelling them to respect and do justice to one's own Ayyaana (spirit) and that of other beings, which provides a context and meaning to the specific values that people ascribe to particular affairs, for example, in the importance ascribed to particular management approaches. As Workineh Kelbessa (2005) put it: "Saffuu is a moral concept that serves as the ethical basis for regulating practices in order to ensure a high standard of conduct appropriate to different situations". We use the term broad values rather than principles, because many important life goals such as creativity or health are not in common parlour seen as moral. In ethics, principles are considered as basic moral propositions, such as 'it is right to tell the truth'. These can be conceived of in an absolute sense (e.g., an action is wrong if it involves lying) or in a contributory sense, where multiple broad values may apply to a given action and help to evaluate whether that action is morally desirable or not (Dancy, 2017). For example, a dishonest action may be justified by a greater good. Different ethical systems have different ways of addressing such conflicts. Environmental ethics has focused on various particular broad values (e.g., avoidance of suffering, Singer (1975); freedom to pursue a life, Regan (1983); harmony, Leopold (1967); self-realisation, Naess (1988); beauty, Hettinger (2010) to justify extension of our concern to the natural world.

In contrast, in social psychology the focus has been on establishing a connection between spectra of broad values and behaviour (Rokeach 1973; Dietz et al., 2005). Values are seen in a contributory sense, and quantitative approaches are used to investigate the relative importance of different broad values to particular behaviours as well as worldviews, beliefs, norms and attitudes (e.g., Stern et al., 1999; Raymond et al., 2010; Steg et al., 2014). Within this tradition, Schwartz (1994) conceptualised 10 different value types, grouped into four broad sets that form two bipolar dimensions: self-transcendence values (reflecting a concern for others like universalism and benevolence) versus self-enhancement values (reflecting a concern for oneself like power and achievement), and conservation values (security, conformity and tradition) versus openness to change values (self-direction, stimulation and hedonism), investigating a degree of universality in structure; while the relative importance of different broad values may be different, they tend to be associated with each other in broadly similar ways independent of cultural context (Schwartz, 2006). These dimensions have since been simplified to measure broad values in environmental research (see e.g., de Groot & Steg 2008). Importantly, broad values are defined as values and life goals.

Other research has considered the cross-cultural relevance of broad values. Inglehart's (2008) World Values Survey identified two major dimensions of cross-cultural variation: (1) Traditional/Secular-rational values and (2) Survival/Self-expression values; and The List of Values Framework is based on the importance of people in value fulfilment (Kahle et al., 1988). Values can be fulfilled through interpersonal relationships (warm relationships, sense of belonging), personal factors (self-fulfilment, being-well respected), or other needs (security, excitement, fun and enjoyment).

However, there are many other expressions of broad values that move beyond the individual to consider elements of cultures and organizations (Kitayama, 2002; Manfredo et al., 2014). England (1967) distinguishes values of individuals, organizational goals, and personal goals. Van Riper et al. (2019) demonstrated that the dynamics of multi-level (individual-culture) values are important for predicting environmental behaviour. Furthermore, there are important differences between knowledge traditions that think of broad values as abstract and generalised (and thus potentially universal in structure), and broad values as undivorceable from their cultural and institutional situation (Kenter et al., 2019). Stolte y Fender (2007) proposes that cultural framing through

narratives shapes the kind of broad values that are applied in any specific situation. In IPLC contexts, broad values can be intimately entwined with worldviews, practices and knowledge (e.g., Houde, 2007) and the difference between broad and specific values may become less clearly delineated (Gould et al., 2019), both because every value judgement is contextual and because there may be less of a divide between subject and object of values.

Recent research in relational worldviews and ontologies highlights the importance of relational broad values, such as care, reciprocity, stewardship and responsibility (Ross et al., 2018; Schröter et al. 2020; Jax et al. 2018; West et al., 2018), web of life, kinship responsibilities and gratitude to nonhumans (de la Cadena, 2015; Knudtson & Suzuki, 2006), such as the Chinese concept of tian ren he yi 天人合一, which can be translated as the harmonious relationship between human beings and nature (Gao, 2016). Broad values are seen as important antecedents to orient environmental action, guide policy, and can motivate environmental protection. Nonetheless, broad values have, so far, been strongly underrepresented in ecosystem management (Raymond and Kenter, 2016).

Justice and sustainability are also broad values, generally shared across cultures. Justice in its different dimensions is mentioned as a central goal in major international environmental agreements and conventions, from the Declaration of the Rio Summit on Sustainable Development in 1992 to the Sustainable Development Goals,[10] as well as in ILK literature, where justice is among the most commonly addressed themes. In policy documents and in scholarly literature relevant to issues of biodiversity and human-nature relationships, justice as a broad value entails different dimensions across timescales, such as: the fair distribution of benefits (including NCP) and burdens across current living generations (distributional justice) and to future generations (intergenerational justice); the fair inclusion in decision-making processes (procedural justice); the fair recognition of the values, identities and knowledge of others in their own terms (recognition justice). Environmental justice originates particularly from distributive and recognition justice (Figueroa 2006) while the more recently used conception of epistemic justice – addressing the injustice of dominant traditions of knowledge and languages of values overshadowing alternative ones – links procedural and recognition justice. These dimensions of justice can be both backward-looking as retributive justice (responses for wrongdoings), as in historical cases of compensation for environmental harm (O'Neill 2017); and forward-looking, as in the question that defines sustainable development in terms of the fair bequest package that current generations owe to future ones (Norton 2005; Page 2007).

Specific values

Specific values are opinions or judgements of the importance of specific things in particular situations and contexts (e.g., the importance of water quality) or states of affairs (e.g., the importance of enacting water quality regulations). For example, the way in which sea cucumbers matter to people can vary depending on various factors: they can be valued for their important ecological role in some coastal ecosystems, but people also ascribe value to them as a traditional medicine, which has driven overfishing (Purdy et al., 2017).

Specific values are guided, illuminated and influenced by broad values. They have also been referred to as 'assigned' (Rokeach, 1973) or 'contextual' values (Kenter et al. 2015; UK NEA 2014), or simply 'importance' (IPBES, 2015). In environmental policy, specific values (e.g., the importance of water quality) are frequently conflated with 'valued objects' (i.e., the things we think of as important like water quality). For instance, agrobiodiversity systems can provide multiple specific values such as nutritious and healthy food for humans and animals, and also contribute to conserve biodiversity through enhanced soil conservation and pollination services.

[10] Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

IPBES has focused on three specific values of and about nature according to three types of justification of why something is important to people: instrumental, intrinsic and relational values.

Box 2.18. In the IPBES Global Assessment, the three specific types of values are understood as follows:

Intrinsic values refers to the value of an entity (e.g., an organism, an ecological process) independent of how it relates to humans. Instrumental values are associated with an entity that serves to achieve an end, interest or preference. Instrumental value includes economic values, regardless whether the entity is directly or indirectly used, or not used (existence and bequest values). Relational values are associated with the meaningfulness of relationships, including the relationships among humans and nature, and among humans, including across generations, via nature (Chan et al., 2016). These values are attached to the entity itself in ways that make it not substitutable, hence not serving an instrumental or utilitarian perspective (O'Neill, 2017) and represent what people consider meaningful about nature (e.g., attachment, responsibility, commitment). Relational values can also be associated with relationships with nature towards achieving a good life, e.g., when choosing "the right thing to do" or in the context of a "meaningful life." (Pascual et al., 2017).

IPBES has highlighted how different values relate to different foci, which include: (i) *Nature*, intended widely to include non-human beings, ecosystems and mother earth, (ii) *Nature's Contributions to People* (NCP), including ecosystem services and nature's gifts, and (iii) relationships to nature that support a *good quality of life*, expressing values relating to ecological sensitivity and harmony with the natural world (Díaz et al., 2018b; IPBES, 2015). We propose a more detailed differentiation within the domain of each value type.

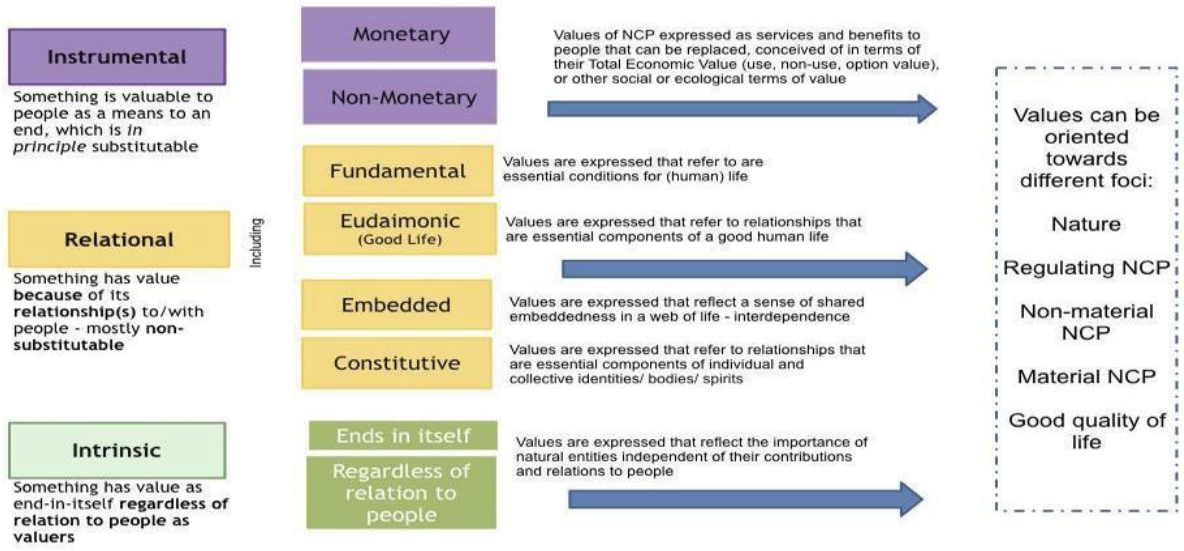

Figure SM2.8 Detailed presentation of different categories of value types.

Types of specific values of/ about nature and human-nature relationships: a historical perspective

We conducted a comprehensive literature review[11] of the specific values of/ about nature and human-nature relationships that are employed in the IPBES Global Assessment (IPBES, 2019). Based on the literature review, we found that before 2016 only two value types were referenced in the academic literature: intrinsic and instrumental values. As for example the Millennium Ecosystem Assessment

[11] Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).

shows, these value types are often conceived as opposite: accordingly, something may either have dignity (intrinsic value) or a price (instrumental value) (MEA, 2005). This dichotomy reflects two predominant, sometimes conflicting approaches in environmental policy: the importance of biodiversity conservation for its own sake, regardless of usefulness to people (Klain et al., 2017; Shanee, 2013) and the importance of nature as a resource for humans (Raymond et al., 2018, Reyers et al., 2012, van der Ploeg et al., 2011). Similarly, intrinsic values are most often associated with biodiversity conservation and biocentric or ecocentric worldviews (Kahn Jr., 1997, King, 2006), whereas instrumental values are strongly associated with ecosystem services and anthropocentric worldviews (Kahn Jr., 1997, 12, Reyers et al., 2012).

In the field of conservation biology and environmental ethics the language of intrinsic value has been dominant to address (a) the value of natural processes and systems regardless of their contribution to human well-being and/or (b) the right of non-human beings and in particular of wilderness areas to exist for their own sake. With the introduction of the CBD and the ES framework instrumental (and relational) language has become more relevant in the debate (Norton 1991; Justus et al. 2009; Batavia & Nelson 2017; Sagoff 2009).

In the sustainability discourse and in environmental and ecological economics the language of instrumental value has been dominant – and it has been increasing after the introduction of ES – to stress the importance of natural processes and entities as means to support human needs and satisfy preferences (Daily 1997; TEEB 2010).

In the dichotomy between biodiversity/ecosystem services or intrinsic/instrumental, each ‘camp’ argues that the other one has been dominant in the last 20 years and that it has not been successful for implementing conservation. On the one hand, the ecosystem services paradigm is presented as a re-enaction of a merely instrumental, economistic, and anthropocentric consideration of nature as resource. A change of paradigm towards biocentric and ecocentric worldviews is deemed necessary for successful policies for conservation and to enhance people’s motivation. On the other hand, the ecosystem services paradigm is presented as innovation with respect to the ‘old’ conservation paradigm rooted in the intrinsic value of nature independently of usefulness to humans. The instrumental approach would offer a wider basis for consensus and be more attractive for a sustainable path. Intrinsic value is considered as not assessable and therefore difficult to implement. Instrumental perspective is more pragmatic.

Despite their being used in opposition, the definitions of intrinsic and instrumental values are sometimes inconsistent and, in many instances, they overlap. For example, values that express the importance of relationships between people and nature used to be designated confusingly as both intrinsic and instrumental because they are neither independent of people’s appreciation (unlike intrinsic values) nor they are just means to an end (unlike instrumental values). Regardless of the terms used, there is a large convergence in academic and policy documents that care (Jax et al., 2018; Pradhan, 2018; Lau et al., 2019), responsibility (IPBES, 2018; De Vreese et al., 2019), including reciprocal responsibilities (May Jr., 2017, James, 2020), identity (De Vos et al., 2018, James, 2020; Norgaard et al., 2017), spiritual meaning (Saner & Bordt, 2016), and sense of place (Marshall et al., 2019, Mrotek, 2019) are essential to understand how and why people express the importance of nature (Moreno-Mateos, 2015; Schröter et al., 2020).

More recently (in the theoretical literature sporadically since 2011, in case studies after 2016), a third category, relational values, has been introduced to explicitly articulate the importance of non-instrumental relationships with nature as a distinct category from either intrinsic or instrumental values (Muraca 2011; Chan et al. 2016). Following this literature, IPBES introduced relational values to address “the meaningfulness of relationships, including the relationships among humans and nature, and among humans, including across generations, via nature” and their importance to a good quality of life (IPBES 2019, p. 30).

Since their introduction, relational values helped clarify the meaning and scope of environmental values, particularly in areas where instrumental and intrinsic value definitions overlapped, were inconsistent, or not very clear. Giving an explicit name to a set of values that have always been considered important made relational values more visible, facilitating empirical research and assessments needed for policy (Chapman et al., 2020, Christie et al., 2019, De Vreese et al., 2019). The increasing use of relational values in environmental research also echoes the recent 'relational turn' in sustainability science (West et al. 2018).

Definition and Use of specific value types of/ about nature: a systematic perspective

After discussing the history of different specific value types, in the following sections we present a systematic synthesis of the results of the literature review. We present for each value type a 'core' definition (based on the most common use in the literature and/ or a synthesis of different definitions where appropriate), different uses and associations with worldviews, broad values or other meanings, and the relevance for policy.

Table SM2.6 Salient definitions and relevant associations of three specific types of values of/ about nature and human-nature relationships - with references.

Value type	**Salient definitions & relevant associations summarized from the literature**
Intrinsic values	1. Defined negatively as **non-instrumental** value (i.a. Campagna, 2017; Fürst, 2015; Regan, 1992) 2. Value of something that is an **end-in-itself**, has **agency** (i.a. Cho, 2020, Reyers et al., 2012, Lockwood, 1999, Saxena, 2018) 3. Value **independent of being valued** or recognized by (human) valuer – inherent properties of something (i.a. Dion, 2000, Ernoul & Wardell-Johnson, 2014; Gale & Ednie, 2019, Haggan, 2010) 4. Regardless of **importance** and/or **usefulness** to humans (i.a. Huge et al., 2020, Holden, 2005, Loreau, 2014) 5. **Inherent moral value** of natural beings (**right to exist**) (i.a. Blennow, 2019, Elliot, 1992, Falk-Andersson et al., 2015, Gomes et al., 2018)
Association w/ **worldviews & broad values**	1. Strongly and explicitly associated with **non-anthropocentric, biocentric or ecocentric worldviews** (i.a. Bujis, 2009, Dizerega, 1992) 2. Strongly associated with **moral obligations** towards other living things of life in general. (i.a. Gray & Curry, 2016; Harrop, 2013; Öhman et al., 2016) 3. Weakly associated with biospheric and altruistic values, and with spirituality (i.a. Kineman & Kumar, 2007; May Jr., 2017)
Instrumental values	1. **Means to an external end** (mostly intended as usefulness for humans, utility, or benefits, sometimes also for other-than-human beings) (i.a. James, 2020; Kineman & Kumar, 2007; Lockwood, 1999; Reyers et al., 2012) 2. Leading to **satisfaction** of needs, preferences, interests, and desires (i.a. Gale & Ednie, 2019; Huge et al., 2020; Jones & Tobin, 2018) 3. Strongly associated with **nature as resource, ecosystem services, asset or property** (i.a. Batavia et al, 2018, Beltrani, 1997; BenDor et al., 2014; Berry et al., 2018; Blennow, 2019; Bonnett, 2012)
Association w/ **worldviews & broad values**	1. Very strongly and explicitly associated with **anthropocentrism** (i.a., Helton & Helton, 2007; Hovardas, 2013; Kahn Jr., 1997)

	2. Strongly and explicitly associated with **utilitarianism** and managerialism (i.a. Falk-Andersson et al., 2015; Farrell et al., 2017; Ghilarov, 2000)
Relational values	1. Values of or deriving from **desirable, meaningful, just, and reciprocal relationships with 'nature' and/or among people through nature** (i.a. Schröter et al., 2020) 2. Values relative to or deriving from **relationships that constitute identity, either cultural, individual, collective or communal**, and **of a good life** (i.a. van der Ploeg et al., 2011; Allen et al., 2018; Verhoog et al., 2007; Dizerega, 1992, Marshall et al., 2019, Norgaard et al., 2017, Musschenga, 2004; Sandberg & Jakobsson, 2018; Chan et al. 2018; Kohler et al., 2019; Gould et al., 2019; Klain et al., 2017, Carretero et al., 2018; Gale & Ednie, 2019; Ishihara, 2018). 3. Values associated with **care for/about specific landscapes, places, human and nonhuman others** (i.a. Lau et al, 2019; Sarkki et al., 2019; Jax et al., 2018; Kahn Jr. & Lourenço, 2002; Ruiz & Sánchez, 2009); **sense of place** (i.a. Basu et al., 2020; De Vos et al., 2018; Marshall et al., 2019; Skubel et al., 2019) 4. Value of nature as a **point of connection among people, binding communities together & supporting social networks** (i.a. Norgaard et al., 2017; García-Llorente et al., 2018; Mrotek, 2019; Marshall et al., 2019; Skubel et al., 2019)
Association w/ **worldviews & broad values**	1. Very strongly associated with **relational, pluricentric or non centric worldviews** that question the strict separation between nature and culture/society/humanity and stress the interdependence between all beings (i.a. Devos et al., 2019; Gould et al., 2019; May Jr., 2017; Saxena, 2018) 2. Very strongly associated with broad values such as: **stewardship, responsibility, care, affection, reciprocity**, harmony with nature, good life, justice. (De Vreese et al., 2019; Gudynas & Acosta, 2011) 3. Strongly associated with **cultural ecosystem services** and with **spiritual values** (Harrop, 2013; Hettinger, 1996; Hofstra, 2017; Kohler et al., 2019)

Intrinsic Values

Intrinsic values in general refer to beings that hold dignity (Millennium-Ecosystem-Assessment, 2005) and ought not to be reduced to mere means to someone else's ends (Kant, 2011). This idea, with respect to the intrinsic value of human beings, is universally recognised and operationalised i.a., in the UN Declaration of Human Rights and central to the SDG vision of a world of "universal respect for human rights and human dignity" (UN, 2015). This perspective is important when people articulate reasons for protecting biodiversity or for sustainable resource management on the ground of obligations of justice towards current living and future generations (Düwell, 2016; Eser et al., 2014; Ott & Döring, 2008; Page, 2007) and represents a key argument for sustainable development as it is expressed by the SDGs. In this section, however, because this very important justification does not directly refer to the value 'of' nature or biodiversity, we limit our analysis to the intrinsic value of other-than-human beings.

The term intrinsic value in such a sense is used in the literature with different, sometimes confusing meanings (O'Neill, 1992, 1993). Sometimes scholars use it as the opposite to instrumental values, sometimes as values independent of human judgment, interests or wellbeing (Himes & Muraca, 2018; Norton, 2005; Pascual et al., 2017; Sagoff, 2009), and sometimes as the inherent moral value or rights of nonhuman beings as in traditional wilderness conservation or animal rights literature (Batavia & Nelson, 2017; Callicott, 2003; Regan, 1986; Rolston, 1994; Taylor, 1986), which often implies the idea of having moral obligations towards other-than-human beings (Eser et al., 2014). In the IPBES framework intrinsic values are equated to non-anthropocentric values and defined as the value of an entity independent of how it relates to humans (Pascual et al., 2017). Here we propose a slight modification of this understanding and, by taking into account the different uses in the literature,

propose a core definition of intrinsic value as the values of other-than-human beings expressed independently of any reference to humans as valuers (Bremer et al., 2018; Christie et al., 2019; Devos et al., 2019; Hovardas, 2013; Pearson, 2016). To say that people value something for its intrinsic value does not mean that it has no relation to them (Sagoff, 2009), just that the reason why it is valued is explicitly expressed as regardless of that relationship (Himes & Muraca, 2018). This can also imply recognizing that those nonhuman beings have their own interests and needs that warrant consideration (O'Neill, 1993; Rolston, 1988; Sandler, 2007; Taylor, 1986). This definition includes entities that are worth protecting as ends in-and-of themselves, and it is consistent with biocentric worldviews (Batavia & Nelson, 2017; Regan, 1986; Rolston, 1994; Taylor, 1986; Himes & Muraca, 2018, van der Ploeg et al., 2011) and covers both a subjective (people attributing intrinsic value to nature) and an objective (value existing in nature regardless of people's attribution) understanding of value.

Framed this way, intrinsic values are not only assessed through biophysical indicators such as abundance and endemism, but can also be subjectively articulated by people (Callicott, 2003) who might act on them and acknowledge consequences to or rights for nonhuman nature in various ways (O'Connor & Kenter, 2019) (see *Figure SM2.9*). Intrinsic values play an important role for the motivation and environmental commitment of people in some parts of the world (Admiraal et al., 2017; Batavia & Nelson, 2017; McShane, 2007) and from this perspective it is very difficult to argue for possible equivalents that might replace them.

Intrinsic values are considered essential in environmental policy to sustain and trigger people's motivation for conservation (Batavia and Nelson 2017; Polasky et al., 2012), in education (Zhang et al., 2013), and to articulate the agency of other-than-human beings as expressed, for example, by Quechua communities in Peru about the mountain Ausangate as a powerful earth-being (De la Cadena 2010). Appealing to intrinsic values can help legitimise environmental protections and improve policy success (O'Connor & Kenter, 2019). However, intrinsic value may sometimes lack consideration of pragmatic elements relevant to environmental management (Minteer et al., 2004). Assessing intrinsic value requires mostly qualitative and participatory methods, which may take longer and require more resources than quantitative or monetary methods (*Chapter 3*).

Instrumental Values

Instrumental values are associated with living and non-living entities, as means to achieve human ends or satisfy human preferences (Pascual et al., 2017). According to a study on ethical arguments in some European biodiversity strategies, those based on this type of justification for the protection of biodiversity amount to: "because it is in our own best interest" (Eser et al., 2014). This is also expressed in many second generation constitutions, which recognize human's right to a clean environment, but not nature's intrinsic right to exist. Natural entities or ecosystems are important, accordingly, not in themselves but insofar as they provide utility to human purposes (Chan et al., 2016; Eser et al., 2014; Rolston, 1994; Weston, 1985). From this perspective, at least in principle, it is acceptable to consider equivalents or substitutes, if available or possible, that can provide similar benefits. Instrumental values are useful when people articulate what matters to them in the language of means-ends relationships, such as the life-saving function of an oxygen bottle (Muraca, 2011) or the relaxing feeling caused by a walk in the woods after a long working day.

Instrumental values can be conjoined with intrinsic values, when, for example, sentient animals are seen as ends-in-themselves, and – in a utilitarian framework – what reduces their suffering is considered as instrumentally good for them (Rolston, 1994).

Based on the literature review we propose to defined instrumental values in their core meaning as the values of things and processes that are important as a means to some human end or to satisfy human preferences (Pascual et al., 2017) and "include economic values, regardless of whether the entity is directly or indirectly used, or not used" (IPBES 2019). In general, the question of whether non-human

nature is only instrumentally valuable as a means to a human end is separate from the question of how we deal with different human and non-human ends, through the consideration of utility or otherwise, such as with regard to rights and duties, virtues or care.

Nature is important insofar as it provides (potential) utility to humans (Chan et al., 2016; Eser et al., 2014; Weston, 1985) and supports communities' economic well-being and subsistence (Lau et al, 2019; Oba et al., 2008; Huge et al., 2020). Instrumental values can help expressing the importance for local and indigenous communities of accessing and using, for example, wild food plants or wild animals (Ghorbani et al., 2012), but also the need for protection from them, as it is the case with the protection of crops from elephants in the Congo Basin (Ngouhouo Poufoun et al., 2016). Because instrumental values refer to a means-to-an-end, the means might be substitutable (Schröter et al., 2020) at least in principle, even if not always in practice.

Instrumental values lend themselves to analysis like the economic costs and benefits involved in ecosystem services, material NPC, or to resource management for sustainable development. They are easier to quantify than other value types and, because they are substitutable in principle, they support high comparability and commensurability, which facilitates trade-off assessments that can be articulated in monetary units. However, purely instrumental approaches to valuation may obscure other value expressions, crowd out other reasons and motivations for environmental protection (Rico García-Amado et al., 2013), alienate stakeholders (De Vreese et al., 2019), and misrepresent conflicts (Hattingh, 2014). For example, as showed in a case study about perceptions of the benefits from and threats to nature in Tierra del Fuego National Park in Argentina, assuming that stakeholders are only motivated by economic gains does not correspond to the values expressed by the Park's primary users and prevents environmental management to better align with public perceptions and needs (Mrotek, 2019).

Instrumental values can be assessed through economic (e.g., monetary) and non-economic (e.g., ecological) indicators.

Relational Values

Given the more recent history of the concept, different meanings and uses of the term relational values coexist in the literature. Scholars often propose to use the term to express explicitly non-instrumental human-nature-relationships and/or to stress strategically those relationships that are in principle not substitutable and lose their meaning if translated into a merely instrumental language (Arias-Arévalo et al., 2017; Himes & Muraca, 2018; Jax et al., 2013; Klain et al., 2017), as in the case of friendship, which is important precisely because of the relationship, but loses its meaning if reduced to a means to an end (O'Neill et al., 2008). The language of intrinsic values is not helpful to articulate these justifications either, because it explicitly disregards relationships in the justification of importance. Here we use relational values to refer to complex human-nature-relationships that are not only integral to a good quality of life but also important for how some people understand themselves as living in and through reciprocal relationships of responsibility in the bioculturally diverse world they inhabit (Kimmerer, 2011; McGregor, 2010).

At its core, relational values refer to the value of desirable, meaningful, and often reciprocal human relationships – beyond means to an end – with nature and among people through nature (Schröter et al., 2020, p. 50; Chan et al. 2016; Chan et al. 2018; Himes and Muraca 2018; De Vos et al., 2018). Accordingly, relational values are often framed as context-dependent, non-transferable, non-tradable, and therefore largely non-substitutable (Kenter et al., 2019). They highlight relationships with nature that constitute people's individual and collective identity (De Vos et al., 2018, James, 2020; May Jr., 2017), deeply rooted sense of place (Marshall et al., 2019, Mrotek, 2019; Norgaard et al., 2017), and spiritual meaning (Saner & Bordt, 2016). For example, in the New Zealand agreement between the indigenous Whanganui Iwi (Maori) people and the Crown, the river Te Awa Tupua is acknowledged

as connected with the identity of the iwi and hapu people in an inalienable way, as the document literally says "I am the River and the River is me" (Te Awa Tupua (Whanganui River Claims Settlement) Bill 2016). Relational Values also include relationships with people and nature that are essential components of a meaningful and flourishing life (eudaimonia), worthy of a human being (Klain et al., 2017; Carretero et al., 2018; Nussbaum, 2011b; Sayer, 2011), including mental and emotional health, virtues and attitudes of care and responsibility towards other people and other-than-human beings (Chan et al., 2016; Jax et al., 2018; Lenzi, 2017; Krebs, 1997; Ott, 2016; van den Born et al., 2018; Pascual et al. 2017; Jax et al., 2018; Pradhan, 2018; Lau et al, 2019). Relational values also help articulating responsibility (IPBES 2018; De Vreese et al., 2019), including reciprocal responsibilities of giving and receiving between people and the natural world (McGregor 2010; May Jr., 2017) as well as across generations (Jones et al., 2010), and support community cohesion and solidarity. In Quechua, for example, reciprocity or ayni is the glue that holds everything together (May Jr., 2017) and for the Karuk fishers "responsibilities to the natural world include ceremonial management of the fishery to ensure "escapement" and burning of the forest to enhance runoff" (Norgaard et al., 2017, p.6). Reciprocal relationships with the natural world are essential for supporting community cohesion, cultural coherence, and social networks, as it is the case of the agdal system, a traditional Berber form of environmental management (Dominguez et al., 2012).

Unlike instrumental values, substitution of or compensation for relational values are problematic not only in practice, but also in principle.

Box 2.19. Types of relational values

The category of relational values is diverse in itself and refers to different forms of human-nature-relationships and their importance for people, which can be summarized in terms of *embedded, fundamental, constitutive,* and *eudaimonic* relationships. These terms are explained in the following paragraph and in *Figure SM2.9*.

- Human-nature-relationships can be expressed through the feeling of being **embedded** in a web of interdependent and dynamic processes (such as the web of life). Such an understanding is expressed for example in worldviews that do not separate humans and nature (Jackson & Palmer, 2015), in some indigenous and local knowledge systems (Zent, 2013), or in ecological aesthetics of nature (Böhme, 1989, 2011; Whitehead, 1966) and ecological psychology (Chemero, 2009; Heft 2003).
- The language of relational values can also express **fundamental** conditions for human life or for life in general, such as for example atmospheric composition and other supporting services of ecosystems (Muraca, 2011, 2016b). Other than instrumental values, when justifying the importance of fundamental relationships, people often have in mind no single entities or functions, but complex processes and systems that are hardly replaceable. Systemic or ecological value can also be expressed in this way (Rolston, 1994) (see *Figure SM2.9*).
- Relational values might also refer to essential components of a **good human life**, i.e a meaningful and flourishing life, worth of a human being (Nussbaum, 2011; Sayer, 2011) including virtues and attitudes of care and responsibility towards other human and more-than-human others (Chan et al., 2016; Jax et al., 2018; Lenzi, 2017). In the literature these values are often called eudaimonic (Krebs, 1997; Ott, 2016; van den Born et al., 2018).

The language of relational values can finally help articulate the importance of relationships that are **constitutive** for one's own identity (both as an individual and as community), including the body or spirit, like kinship (de la Cadena & Blaser, 2018; de la Cadena, 2015; Whyte, 2018b), as well as the value of reciprocal responsibilities (Sakakibara, 2009; Whyte, 2018b), co-becoming (Jackson & Palmer, 2015), interdependence (Whyte, 2018b; Zent, 2014a), care (Geist & Galatowitsch, 1999; Jax et al., 2018; Tronto, 1993), stewardship for nature as well as partnership with nature (de Groot et al., 2012; Duong & van den Born, 2019), the meaning of place (Casey, 1993; Drenthen, 2011) and the stratified meanings of cultural landscapes (Drenthen, 2009). According to First Nations scholars Whyte and McGregor, interdependence includes "a sense of identity associated with the environment" (Whyte, 2018, p. 127) and implies not only

that nonhuman beings are endowed with agency, but also that they are involved in relations of reciprocal care-taking and responsibility (McGregor, 2010). Ecological values can also be considered as constitutive when focussed on continuing reciprocal responsibilities of kinship (Whyte, 2018b) – see *Figure SM2.9*.

In policymaking, relational values can help articulate the idea that a specific place, a forest, a river, a landscape, or a population are essentially important to people (individuals or communities) because of the unique relationships, history, and traditions that bind them together (Kothari & Bajpai 2017), as expressed for example in the Japanese concept of Fudo that refers to interrelationships between people and local characteristics (2012). To date, relational values in policy documents are used mainly to highlight targets and strategies rather than direct specific policy actions, but academic literature suggests that they can benefit policies directly by accounting for contextual NCP (Díaz et al. 2018). Integrating relational values into policy actions can help operationalise broad policy guidance (e.g., IPBES) to regional, national and local scales (Kitheka et al., 2019). Relational values can catalyze motivation and appeal to a broader audience (Winkler & Hauck, 2019; Stenseke, 2018), particularly for IPLC (Himes & Muraca, 2018; Gould et al., 2019), and increase participation of different stakeholders (Kitheka et al., 2019; Jax et al., 2018). By stressing reciprocal relationships, they can facilitate social equity and environmental sustainability (Diver et al. 2019).

Finally, relational values may play a critical role in bottom-up governance by facilitating communication between diverse value articulating institutions and shifting focus from what is important (instrumental and intrinsic perspectives) to why it is important (the relationships that give it value). For example, in the case of the Klamath River, conflict percolated from intractable arguments between the monetary value of irrigating farm crops and the intrinsic value of protecting endangered species of fish that also depended upon the water from the river. The conflict between these values was institutionalised in government policies (e.g., the endangered species act vs. government developed irrigation infrastructure and agricultural subsidies). The conflict was largely de-escalated when local stakeholders collaborated and negotiated solutions that accounted for the multitude of different ways that farmers, indigenous peoples, environmentalists and fishers related to and found fulfilment and identity in the Klamath region.

Although relational values can be assessed using quantitative methods (Schulz and Martin-Ortega 2018), qualitative, participatory, and mixed methods approaches, as well as the employment of socio-cultural indicators are more adequate to fully capture their meaning.

Overlaps across value types

Gradients across value types and NCP

The IPBES conceptual framework expresses both NCP and good quality of life in terms of instrumental or relational values on a gradient, where NCP more relevant for a good human life are situated closer to the relational value pole (Díaz et al., 2015; Pascual et al., 2017). However, regulating NCP might be more adequately justified in terms of fundamental relational values rather than in a merely instrumental language, as their replaceability is often limited (particularly at larger scales) and ethically highly controversial. Ecological value indicators can also be placed on a gradient between instrumental and relational value, depending on how people in different communities justify their importance and whether they consider them or not open to trade-offs (*Figure SM2.9*).

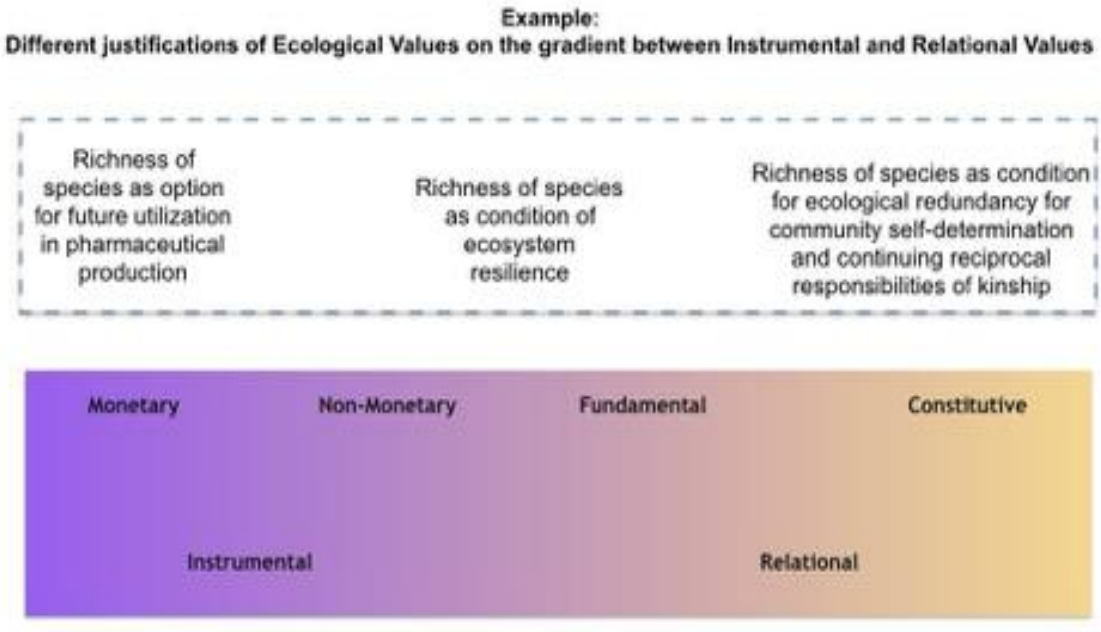

Figure SM2.9 Example of different ways in which ecological value can be expressed and justified.

Through this broader understanding, in addition to nature, NCP, and good quality of life, it might also be possible to address a fourth essential aspect of why and how human-nature-relationship matter in terms of ethical responsibility towards Mother Earth or the web of life (de la Cadena, 2015; Knudtson & Suzuki, 2006). In many indigenous worldviews, from the Andes and the Northern Great Lakes, the focus is neither "good quality of life" nor Mother Earth or nature independently of people, but kinship obligations of responsibility, respect, care, gratitude to other nonhuman persons. These are not unidirectional but imply “mutual relations of coexistence” (Kimmerer, 2011; Nemogá, 2019; Whyte, 2018b). In addition to the gradient between instrumental and relational value, this perspective would require a gradient between intrinsic and relational values (*Figure SM2.10*). On this gradient many arguments linking the importance of ecosystems and biodiversity as life support systems to the importance of nature independent of its contributions to people would sit.

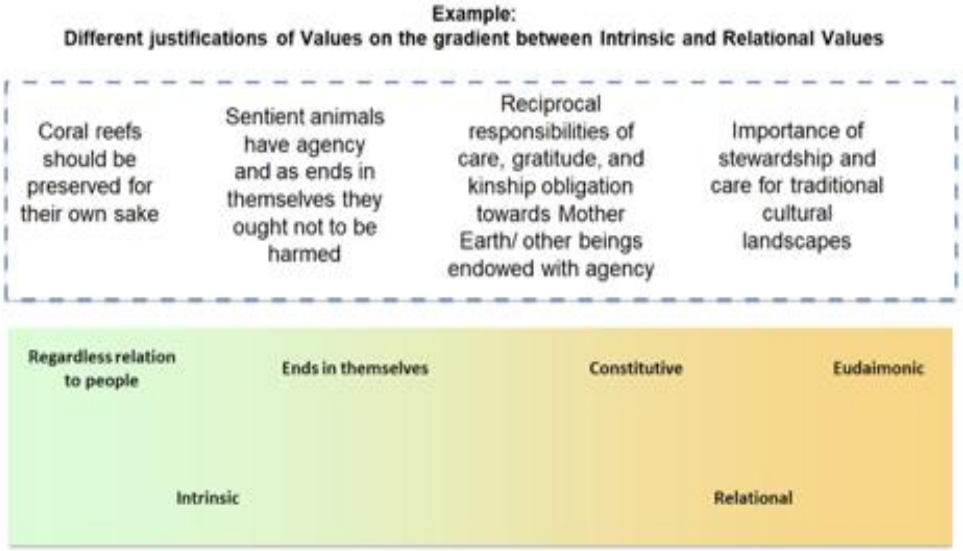

Figure SM2.10 Examples of different ways in which relationships of co-existence with nonhuman beings can be expressed and justified.

Life-support values

The way in which people express the value of life-supporting processes – biophysical, spiritual, or symbolic – can be found in the literature as an overlapping dimension cutting across all three value types. This dimension, considered foundational for the articulation of other environmental value types, can also express the specific values associated with the diverse understandings of "nature" in IPBES (2019), which depend on different worldviews, languages, cultural settings, specific decision contexts, and institutions. To account for these multiple concepts found in the literature, we use here the operational term "life-support values". A thorough analysis of this overlapping category denotes a gap in the literature on the specific values of/ about nature and human-nature relationships.

Fundamental values are associated with: (a) intrinsic values (importance of evolutionary and ecological processes) to highlight people-nature interdependence (IPBES 2019, p. 30; Hattingh, 2014; Kahn Jr., 1997; Rolston, 1993) and how they enable other values to arise (Rolston 1989); (b) instrumental values (importance of supporting services (MEA, 2005; Rolston, 1993) functional values (Lockwood, 1999); indirect use values (Hansjürgens 2014; TEEB Foundations; critical natural capital, DesRoches, 2019, regulating NCP) to stress their indirect function in supporting other ecosystem services or nature contributions to people; (c) relational values (fundamental values) to refer to the importance of life supporting processes that give sense to people's existence and identity (Schröter et al., 2020; Arias-Arévalo et al. 2018; Muraca 2011 & 2016). The latter also includes the spiritual and symbolic meaning of life-giving and life-regenerating processes in specific contexts (including contextual NCP), as expressed for example in the idea of Pachamama, referring to earth's generative powers and to the very constitution of life (Silverblatt, 1987; Pacari, 2009; Macas, 2010; Tola 2018) or contextual spiritual foundations for the regeneration of life, practices, and reciprocal relations as in the meaning for the Dongria people of the Niyamgiri Mountains, which "not only provide the people with life and livelihoods, they are also worshipped as the upholders of the Earth and the laws of the Universe." (Writ Petition, 1995 No. 549).

Why value justification matters for environmental policy and decision making

The way in which people justify why they value human-nature-relationships can be elicited and assessed through different methods of valuation that employ various indicators, some of which are more or less adequate to reflect specific justification languages.

Convergence across different value types and policy relevance

Despite the distinct core definitions of environmental value types, they are not mutually exclusive and often converge and overlap (Pascual et al., 2017; Himes and Muraca 2018; Schröter et al., 2020). This convergence can be used by policy makers to build common ground across different stakeholders in support of biodiversity conservation and/or equitable development (Berry et al., 2018). How something is valued does not only depend on its characteristics, but also how people relate to it or what they seek to obtain, which in turn depends on context, broad values and value-articulating institutions (Himes & Muraca, 2018). For example, food may at the same time have instrumental and relational value depending on the context of meaning and on the local practices that govern interactions with it (Whyte 2018, 2018a, 2018b; Lau et al., 2019). In Mahahe, wild fruits are not only appreciated as important additions to the diet, but also for their beauty and because the trees offer shade and a gathering place for the community (Schnegg et al., 2014). In Madagascar, the forest does not only provide the basis for wellbeing, but also secures "a sense of identity and kinship for the current and future generations" (Fritz-Vietta 2016).

Considering diverse values can help policy makers by making otherwise neglected, non-tangible costs and benefits visible (Witt et al., 2019), facilitating a more inclusive and just articulation of values (Himes & Muraca, 2018), clarifying, reducing or avoiding conflicts by fostering co-management

(García-Llorente et al., 2018) and participation among different stakeholders (Gale & Ednie, 2019; Arias-Arévalo et al., 2017; Berry et al. 2018; Reed & Ceno, 2015), and increasing the acceptability of environmental interventions through better communication (Hope & Jones, 2014; Witt et al., 2019). It can strengthen motivations of people towards conservation (Winkler & Hauck, 2019), enable better collaboration across disciplines (Chan et al. 2018) and support broad alliances for win-win solutions (Reyers et al., 2012). Widening the perspective beyond instrumental or intrinsic values to include relational values can help highlight non-quantifiable aspects and non-commensurable values and ultimately lead to more effective, inclusive and fair outcomes (Jacobs et al., 2016; Kohler et al., 2019). More pluralistic value assessments reduce the risk of crowding out other motivations and helps build common ground and reciprocal learning across different stakeholders by acknowledging different reasons and motivations (Rico García-Amado et al., 2013). The *Buen Vivir* concept exemplifies the articulation of indigenous philosophies and relational values in local and national policy-making in South America, which also has connections with Rights of Nature conceptualisations and policies.

In the Klamath basin, for example, conflict erupted when protection of fish under the endangered species act (intrinsic value) threatened agricultural production (instrumental value) dependent on federal irrigation projects drawing on limited water from the Klamath river that supported the fish. Collaborative efforts initiated under pressure from indigenous peoples allowed stakeholders to articulate the different ways the Klamath basin was important to them and led to an agreement to remove dams that recognized instrumental, intrinsic and relational values of nature's contributions to people in the region.

References

Admiraal, J. F., Van Den Born, R. J. G., Beringer, A., Bonaiuto, F., Cicero, L., Hiedanpää, J., Knights, P., Knippenberg, L. W. J., Molinario, E., Musters, C. J. M., Naukkarinen, O., Polajnar, K., Popa, F., Smrekar, A., Soininen, T., Porras-Gomez, C., Soethe, N., Vivero-Pol, J.-L., & De Groot, W. T. (2017). Motivations for committed nature conservation action in Europe. Environmental Conservation, 44(2), 148–157. Scopus. https://doi.org/10.1017/S037689291700008X

Allen, K. E., Quinn, C. E., English, C., & Quinn, J. E. (2018). Relational values in agroecosystem governance. *Current Opinion in Environmental Sustainability*, *35*, 108–115. https://doi.org/10.1016/j.cosust.2018.10.026

Aparicio. (2015). As metamorfoses dos humanos em presas do timbó. Os Suruwaha e a morte por envenenamento. Revista de Antropología, 58(2), 314–344.

Arias-Arévalo, P., Martín-López, B., & Gómez-Baggethun, E. (2017). Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems. Ecology and Society, 22(4). Scopus. https://doi.org/10.5751/ES-09812-220443

Arias-Arévalo, Paola, 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

Basu, M., Hashimoto, S., & Dasgupta, R. (2020). The mediating role of place attachment between nature connectedness and human well-being: Perspectives from Japan. *Sustainability Science*, *15*(3), 849–862. https://doi.org/10.1007/s11625-019-00765-x

Batavia, C., & Nelson, M. P. (2017). For goodness sake! What is intrinsic value and why should we care? Biological Conservation, 209, 366–376. Scopus. https://doi.org/10.1016/j.biocon.2017.03.003

Batavia, C., Bruskotter, J. T., Jones, J. A., Vucetich, J. A., Gosnell, H., & Nelson, M. P. (2018). Nature for whom? How type of beneficiary influences the effectiveness of conservation outreach messages. *Biological Conservation*, *228*, 158–166. Scopus. https://doi.org/10.1016/j.biocon.2018.10.029

Belaunde, L. E. (2005). Ciudadanía y cultura política entre los Awajún, Ashántika y Shipibo-Knonibo de la Amazonía peruana. Centro Amazónico de Antropología y Aplicación Práctica.

Beltrani, G. (1997). Safeguard Subjects: The Conflict between Operationalization and Ethical Justification. *International Journal of Life Cycle Assessment*, *2*(1), 45–51. Scopus. https://doi.org/10.1007/BF02978720

BenDor, T., Shoemaker, D. A., Thill, J.-C., Dorning, M. A., & Meentemeyer, R. K. (2014). A mixed-methods analysis of social-ecological feedbacks between urbanization and forest persistence. *Ecology and Society*, *19*(3), 3. https://doi.org/10.5751/ES-06508-190303

Berry, P. M., Fabók, V., Blicharska, M., Bredin, Y. K., Llorente, M. G., Kovács, E., Geamana, N., Stanciu, A., Termansen, M., Jääskeläinen, T., Haslett, J. R., & Harrison, P. A. (2018). Why conserve biodiversity? A multi-national exploration of stakeholders' views on the arguments for biodiversity conservation. *Biodiversity and Conservation*, *27*(7), 1741–1762. Scopus. https://doi.org/10.1007/s10531-016-1173-z

Blennow, K., Persson, E., & Persson, J. (2019). Are values related to culture, identity, community cohesion and sense of place the values most vulnerable to climate change? *Plos One*, *14*(1), e0210426. https://doi.org/10.1371/journal.pone.0210426

Böhme, G. (1989). Für eine ökologische Naturästhetik. Suhrkamp. https://books.google.de/books?id=OsqwbwAACAAJ

Böhme, G. (2010). The Concept of Body as the Nature We Ourselves Are. The Journal of Speculative Philosophy, 24(3), 224–238. https://doi.org/10.1353/jsp.2010.0009

Bonnett, M. (2012). Environmental concern, moral education and our place in nature. *Journal of Moral Education*, *41*(3), 285–300. Scopus. https://doi.org/10.1080/03057240.2012.691643

Bremer, L. L., Brauman, K. A., Nelson, S., Prado, K. M., Wilburn, E., & Fiorini, A. C. O. (2018). Relational values in evaluations of upstream social outcomes of watershed Payment for Ecosystem Services: A review. *Current Opinion in Environmental Sustainability*, *35*, 116–123. Scopus. https://doi.org/10.1016/j.cosust.2018.10.024

Brennan, R. E. (2018). Re-storying marine conservation: Integrating art and science to explore and articulate ideas, visions and expressions of marine space. Ocean and Coastal Management, 162(1), 110–126. https://doi.org/10.1016/j.ocecoaman.2018.01.036

Brondizio, E. S., Gatzweiler, F. W., Zografos, C., & Kumar, M. (2010). Socio-cultural context of ecosystem and biodiversity valuation. In P. Kumar (Ed.), The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations. Routdledge. http://www.teebweb.org/our-publications/teeb-study-reports/ecological-and-economic-foundations/#.Ujr1xH9mOG8

Buijs, A. E. (2009). Lay people's images of nature: Comprehensive frameworks of values, beliefs, and value orientations. *Society and Natural Resources*, *22*(5), 417–432. Scopus. https://doi.org/10.1080/08941920801901335

Callicott, B. (2003). The Conceptual Foundations of the Land Ethic. In D. VanDeVeer & C. Pierce (Eds.), The Environmental Ethics and Policy Book (pp. 224–238). Thomson.

Carretero, A. M. H., Burgui, M., De Castro, F. V., & Vázquez, J. M. C. (2018). Do textbooks respond to the requirements of Environmental Education? An analysis in Secondary Education. *Boletin de La Asociacion de Geografos Espanoles*, *2018*(77), 80–110. Scopus. https://doi.org/10.21138/bage.2535

Casey, E. S. (1993). Getting Back Into Place: Toward a Renewed Understanding of the Place-world. Indiana University Press. https://books.google.de/books?id=s7QsBo5IHqAC

Centemeri, L. (2015). Reframing problems of incommensurability in environmental conflicts through pragmatic sociology: From value pluralism to the plurality of modes of engagement with the environment. Environmental Values, 24(3), 299–320. https://doi.org/10.3197/096327114X13947900181158

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

Chan, K. M. A., Gould, R. K., & Pascual, U. (2018). Editorial overview: Relational values: what are they, and what's the fuss about? Current Opinion in Environmental Sustainability, 35, A1–A7. https://doi.org/10.1016/j.cosust.2018.11.003

Chapman, M., Satterfield, T., Wittman, H., & Chan, K. M. (2020). A payment by any other name: Is Costa Rica's PES a payment for services or a support for stewards? *World Development*, *129*. Scopus. https://doi.org/10.1016/j.worlddev.2020.104900

Chemero, A. (2009). Radical Embodied Cognitive Science. MIT Press.

Cho, H.-C. (2009). Interconnectedness and Intrinsic Value as Ecological Principles: An appropriation of Karl Rahner's Evolutionary Christology. *Theological Studies*, *70*(3), 622–637. Scopus. https://doi.org/10.1177/004056390907000305

Christie, M., Martín-López, B., Church, A., Siwicka, E., Szymonczyk, P., & Mena Sauterel, J. (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. Scopus. https://doi.org/10.1007/s11625-019-00716-6

Cooke, B., West, S., & Boonstra, W. J. (2016). Dwelling in the biosphere: Exploring an embodied human–environment connection in resilience thinking. Sustainability Science, 11(5), 831–843. https://doi.org/10.1007/s11625-016-0367-3

Cumming, G., & Norwood, C. (2012). The Community Voice Method: Using participatory research and filmmaking to foster dialog about changing landscapes. Landscape and Urban Planning, 105(4), 434–444. https://doi.org/10.1016/j.landurbplan.2012.01.018
Cunsolo, A., & Landman, K. (2017). Introduction: To Mourn Beyond the Human. In Mourning Nature: Hope at the Heart of Ecological Loss and Grief. McGill-Queens University Press.
Daily, G. C. (1997). Nature's services (Vol. 3). Island Press, Washington, DC.
de Groot, J., & Steg, L. (2008). Value Orientations to Explain Beliefs Related to Environmental Significant Behavior. Environment and Behavior, 40(3), 330–354.
de Groot, R., Brander, L., van der Ploeg, S., Costanza, R., Bernard, F., Braat, L., Christie, M., Crossman, N., Ghermandi, A., Hein, L., Hussain, S., Kumar, P., McVittie, A., Portela, R., Rodriguez, L. C., ten Brink, P., & van Beukering, P. (2012). Global estimates of the value of ecosystems and their services in monetary units. Ecosystem Services, 1(1), 50–61. https://doi.org/10.1016/j.ecoser.2012.07.005
de la Cadena, M. (2010). Indigenous Cosmqpolitics in The Andes: Conceptual Reflections beyond "Politics." Cultural Anthropology, 25(2), 334–370.
de la Cadena, M. (2015). Earth Beings: Ecologies of Practice across Andean Worlds. Duke University Press.
de la Cadena, M. (2019). Uncommoning Nature: Stories from the Anthropo-Not-Seen. In P. Harvey, C. Krohn-Hansen, & K. G. Nustad (Eds.), Anthropos and the material (pp. 35–58). Duke University Press.
de la Cadena, M., & Blaser, M. (2018). A World of Many Worlds. Duke University Press. https://books.google.de/books?id=ptpyDwAAQBAJ
De Vos, A., Joana, C. B., & Dirk, R. (2018). Relational values about nature in protected area research. *Current Opinion in Environmental Sustainability*, *35*, 89–99. Scopus. https://doi.org/10.1016/j.cosust.2018.10.018
De Vreese, R., Van Herzele, A., Dendoncker, N., Fontaine, C. M., & Leys, M. (2019). Are stakeholders' social representations of nature and landscape compatible with the ecosystem service concept? *Ecosystem Services*, *37*. Scopus. https://doi.org/10.1016/j.ecoser.2019.100911
Descola, P. (2012). Beyond nature and culture. Forms of attachment. HAU: Journal of Ethnographic Theory, 2(1), 447–471.
DesRoches, C. T. (2019). On the Concept and Conservation of Critical Natural Capital. International Studies in the Philosophy of Science, 32(3–4), 207–228. https://doi.org/10.1080/02698595.2020.1788347
Devos, Y., Munns, W. R., Forbes, V. E., Maltby, L., Stenseke, M., Brussaard, L., Streissl, F., & Hardy, A. (2019). Applying ecosystem services for pre-market environmental risk assessments of regulated stressors. *EFSA Journal*, *17*, N.PAG-N.PAG. Academic Search Premier.
Díaz, J., Carmona, R., Mirón, I. J., Ortiz, C., León, I., & Linares, C. (2015). Geographical variation in relative risks associated with heat: Update of Spain's Heat Wave Prevention Plan. Environment International, 85, 273–283. https://doi.org/10.1016/j.envint.2015.09.022
Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., Hill, R., Chan, K. M. A., Baste, I. A., Brauman, K. A., Polasky, S., Church, A., Lonsdale, M., Larigauderie, A., Leadley, P. W., van Oudenhoven, A. P. E., van der Plaat, F., Schröter, M., Lavorel, S., … Shirayama, Y. (2018). There is more to Nature's Contributions to People than Ecosystem Services – A response to de Groot et al. Science Letters, 359(6373). http://science.sciencemag.org/content/359/6373/270/tab-e-letters
Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental Values. Annu. Rev. Environ. Resour, 30, 335–372. https://doi.org/10.1146/annurev.energy.30.050504.144444
Dion, M. (2000). The moral status of non-human beings and their ecosystems. *Ethics, Place and Environment*, *3*(2), 221–229. Scopus. https://doi.org/10.1080/713665891

Diver, S., Vaughan, M., Baker-Medard, M., & Lukacs, H. (2019). Recognizing "reciprocal relations" to restore community access to land and water. International Journal of the Commons, 13(1), 400–429. https://doi.org/10.18352/ijc.881

Dizerega, G. (1992). Social ecology, deep ecology, and liberalism. *Critical Review*, *6*(2–3), 305–370.

Dominguez, P., Bourbouze, A., Demay, S., Genin, D., & Kosoy, N. (2012). Diverse Ecological, Economic and Socio-Cultural Values of a Traditional Common Natural Resource Management System in the Moroccan High Atlas: The Aït Ikiss Tagdalts. *Environmental Values*, *21*(3), 277–296. https://doi.org/10.3197/096327112X13400390125939

Drenthen, M. (2009). Ecological Restoration and Place Attachment: Emplacing Non-Places ? Environmental Values, 18(3), 285–312. https://doi.org/10.3197/096327109X1247473937645

Drenthen, M. (2011). Reading ourselves through the land: Landscape hermeneutics and ethics of place. In F. Clingerman & M. Dixon (Eds.), Placing nature on the borders of religion, philosophy and ethics. Ashgate.

Duong, N. T. B., & van den Born, R. J. G. (2019). Thinking About Nature in the East: An Empirical Investigation of Visions of Nature in Vietnam. Ecopsychology. https://doi.org/10.1089/eco.2018.0051

Düwell, M. (2016). Human dignity and intergenerational human rights. In G. Bos & M. Düwell (Eds.), Human Rights and Sustainability—Moral Responsibilities for the Future (pp. 69–81). Routledge. https://doi.org/10.4324/9781315665320-6

Elliot, R. (1992). Intrinsic value, environmental obligation and naturalness. *Monist*, *75*(2), 138. Academic Search Premier.

England, G W. (1967). Organizational Goals and Expected Behaviour of American Manager's. Academy of Management Journal, 10, 107–117.

Erdrich, L. (2006). Books and Islands in Ojibwe Country. Harper.

Ernoul, L., & Wardell-Johnson, A. (2014). Adapting international conservation strategies to local context: Perceptions of biodiversity values and management responsibility in two Mediterranean deltas. *International Journal of Biodiversity Science, Ecosystem Services and Management*, *10*(4), 300–312. Scopus. https://doi.org/10.1080/21513732.2014.980849

Escobar, A. C. N.-C. S. H. . P. E. B. (2008). Territories of difference: Place, movements, life, redes. Duke University Press.

Eser, U., Albrecht, M., Neureuther, A. K., & Seyfang, H. (2014). Prudence, justice and the good life: A typology of ethical reasoning in selected European national biodiversity strategies.

Falk-Andersson, J., Foley, N. S., Armstrong, C. W., van den Hove, S., van Rensburg, T. M., & Tinch, R. (2015). A deliberative approach to valuation and precautionary management of cold water corals in Norway. *Maritime Studies*, *14*(1). Scopus. https://doi.org/10.1186/s40152-015-0023-z

Farrell, D., Carr, L., & Fahy, F. (2017). On the subject of typology: How Irish coastal communities' subjectivities reveal intrinsic values towards coastal environments. *Ocean & Coastal Management*, *146*, 135–143. https://doi.org/10.1016/j.ocecoaman.2017.06.017

Figueroa, R. M. (2006). Evaluating Environmental Justice Claims. In J. R. Bauer (Ed.), Forging environmentalism: Justice, livelihood, and contested environments. M.E. Sharpe.

Frame, B., & O' Connor, M. (2011). Integrating valuation and deliberation: The purposes of sustainability assessment. Environmental Science & Policy, 14(1), 1–10. https://doi.org/10.1016/j.envsci.2010.10.009

Fritz-Vietta, N. V. M. (2016). What can forest values tell us about human well-being? Insights from two biosphere reserves in Madagascar. Landscape and Urban Planning, 147, 28–37. Scopus. https://doi.org/10.1016/j.landurbplan.2015.11.006

Fürst, C. (2015). Does using the ecosystem services concept provoke the risk of assigning virtual prices instead of real values to nature? Some reflections on the benefit of ecosystem services

for planning and policy consulting. *European Journal of Ecology*, *1*(2), 39–44. Scopus. https://doi.org/10.1515/eje-2015-0015

Gale, T., & Ednie, A. (2019). Can intrinsic, instrumental, and relational value assignments inform more integrative methods of protected area conflict resolution? Exploratory findings from Aysén, Chile. *Journal of Tourism and Cultural Change*. Scopus. https://doi.org/10.1080/14766825.2019.1633336

Gao, S. (2016). Zhu Xi's Investigation of Things and Environmental Ethics: A Response to Seth D. Clippard. *Journal for the Study of Religion, Nature & Culture*, *10*(1), 44–48. Academic Search Premier.

García-Llorente, M., Harrison, P. A., Berry, P., Palomo, I., Gómez-Baggethun, E., Iniesta-Arandia, I., Montes, C., García del Amo, D., & Martín-López, B. (2018). What can conservation strategies learn from the ecosystem services approach? Insights from ecosystem assessments in two Spanish protected areas. *Biodiversity and Conservation*, *27*(7), 1575–1597. Scopus. https://doi.org/10.1007/s10531-016-1152-4

Garcia-Llorente, M., Rubio-Olivar, R., & Gutierrez-Briceno, I. (2018). Farming for Life Quality and Sustainability: A Literature Review of Green Care Research Trends in Europe. *International Journal of Environmental Research and Public Health*, *15*(6), 1282. https://doi.org/10.3390/ijerph15061282

Geist, C., & Galatowitsch, S. M. (1999). Reciprocal model for meeting ecological and human needs in restoration projects. Conservation Biology, 13(5), 970–979. https://doi.org/10.1046/j.1523-1739.1999.98074.x

Ghilarov, A. M. (2000). Ecosystem functioning and intrinsic value of biodiversity. *Oikos*, *90*(2), 408–412. Scopus. https://doi.org/10.1034/j.1600-0706.2000.900222.x

Ghorbani, A., Langenberger, G., & Sauerborn, J. (2012). A comparison of the wild food plant use knowledge of ethnic minorities in Naban River Watershed National Nature Reserve, Yunnan, SW China. *Journal of Ethnobiology and Ethnomedicine*, *8*(1), 17. https://doi.org/10.1186/1746-4269-8-17

Gomes, I., Perez-Jorge, S., Peteiro, L., Andrade, J., Bueno-Pardo, J., Quintino, V., Rodrigues, A. M., Azevedo, M., Vanreusel, A., Queiroga, H., & Deneudt, K. (2018). Marine biological value along the Portuguese continental shelf; insights into current conservation and management tools. *Ecological Indicators*, *93*, 533–546. https://doi.org/10.1016/j.ecolind.2018.05.040

Gould, R. K., Pai, M., Muraca, B., & Chan, K. M. (2019). He 'ike 'ana ia i ka pono (it is a recognizing of the right thing): How one indigenous worldview informs relational values and social values. *Sustainability Science*, *14*(5), 1213–1232. Scopus. https://doi.org/10.1007/s11625-019-00721-9

Gray, J., & Curry, P. (2016). Ecodemocracy: Helping wildlife's right to survive. *Ecos*, *37*(1), 18–27. Scopus.

Gudynas, E., & Acosta, A. (2011). La renovación de la crítica al desarrollo y el buen vivir como alternativa. *The Renewal of the Criticism of Development and Harmonious Coexistence as an Alternative.*, *16*(53), 71–83. Academic Search Premier.

Haggan, N. (2010). "You Don't Know What You've Got 'Til it's Gone": The Case for Spiritual Values in Marine Ecosystem Management. In *World Fisheries: A Social-Ecological Analysis* (pp. 224–246). Scopus. https://doi.org/10.1002/9781444392241.ch13

Hansjürgens, B. (2014). Ecosystem services and their economic valuation in the focus of politics and resarch in Germany. Natur Und Landschaft, 89(2), 56–60. https://doi.org/10.17433/2.2014.50153254.56-60

Harrop, S. R. (2013). Wild Animal Welfare in International Law: The Present Position and the Scope for Development. *Global Policy*, *4*(4), 381–390. Scopus. https://doi.org/10.1111/1758-5899.12086

Hattingh, J. (2014). Protection of the environment, the biosphere and biodiversity. In *Handbook of Global Bioethics* (pp. 225–250). Scopus. https://doi.org/10.1007/978-94-007-2512-6_80

Heft, H. (2001). Ecological Psychology in Context: James Gibson, Roger Barker, and the Legacy of William James's Radical Empiricism Resources for Ecological Psychology. Lawrence Erlbaum Associates, Inc.

Helton, W. S., & Helton, N. D. (2007). The intrinsic value of nature and moral education. *Journal of Moral Education*, *36*(2), 139–150. Scopus. https://doi.org/10.1080/03057240701325225

Hettinger, N. (1996). Book reviews. *Environmental Ethics*, *18*(1), 99. Academic Search Premier.

Hettinger, N. (2010). Animal Beauty, Ethics, and Environmental Preservation: Environmental Ethics, 32(2), 115–134. https://doi.org/10.5840/enviroethics201032215

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

Hofstra, N. (2017). *Regenerative firms* (Vol. 26, p. 249). Scopus. https://doi.org/10.1108/S1572-832320170000026016

Holden, A. (2005). Achieving a sustainable relationship between common pool resources and tourism: The role of environmental ethics. *Journal of Sustainable Tourism*, *13*(4), 339–352. Scopus. https://doi.org/10.1080/09669580508668561

Hope, A. L. B., & Jones, C. R. (2014). The impact of religious faith on attitudes to environmental issues and Carbon Capture and Storage (CCS) technologies: A mixed methods study. *Technology in Society*, *38*, 48–59. Scopus. https://doi.org/10.1016/j.techsoc.2014.02.003

Houde, N. (2007). The Six Faces of Traditional Ecological Knowledge: Challenges and Opportunities for Canadian Co-Management Arrangements. Ecology and Society, 12(2), art34. https://doi.org/10.5751/ES-02270-120234

Hovardas, T. (2013). A Critical Reading of Ecocentrism and Its Meta-Scientific Use of Ecology: Instrumental Versus Emancipatory Approaches in Environmental Education and Ecology Education. *Science and Education*, *22*(6), 1467–1483. Scopus. https://doi.org/10.1007/s11191-012-9493-1

Huge, J., de Bisthoven, L. J., Mushiete, M., Rochette, A.-J., Candido, S., Keunen, H., Dandouh-Guebas, F., Koedam, N., & Vanhove, M. P. M. (2020). EIA-driven biodiversity mainstreaming in development cooperation: Confronting expectations and practice in the DR Congo. *Environmental Science & Policy*, *104*, 107–120. https://doi.org/10.1016/j.envsci.2019.11.003

Inglehart, R. (2008). World Vallues Survey. http://www.worldvaluessurvey.org/wvs.jsp

Ingold, T. (2011). Being alive: Essays on movement, knowledge and description. Taylor and Francis.

IPBES. (2015). Preliminary guide regarding diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services (deliverable 3 (d)). IPBES Secretariat. https://ipbes.net/sites/default/files/downloads/IPBES-4-INF-13_EN.pdf

IPBES. (2018). The assessment report on land degradation and restoration (p. 748).

IPBES. (2019a). Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (p. 44). IPBES Secretariat. 978-3-947851-13-3

IPBES. (2019b). The IPBES Global Assessment on Biodiversity and Ecosystem Services Chapter 1. Assessing a planet in transformation: Rationale and approach of the IPBES Global Assessment on Biodiversity and Ecosystem Services (p. 69).

Ishihara, H. (2018). Relational values from a cultural valuation perspective: How can sociology contribute to the evaluation of ecosystem services? *Current Opinion in Environmental Sustainability*, *35*, 61–68. Scopus. https://doi.org/10.1016/j.cosust.2018.10.016

Jackson, S., & Palmer, L. R. (2015). Reconceptualizing ecosystem services: Possibilities for cultivating and valuing the ethics and practices of care. Progress in Human Geography, 39(2), 122–145. https://doi.org/10.1177/0309132514540016

Jacobs, S., Dendoncker, N., Martín-López, B., Barton, D. N., Gomez-Baggethun, E., Boeraeve, F., McGrath, F. L., 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, D., … Washbourn, C.-L. (2016). A new valuation school: Integrating diverse values of nature in resource and land use decisions. *Ecosystem Services*, *22*, 213–220. Scopus. https://doi.org/10.1016/j.ecoser.2016.11.007

James, S. P. (2020). Legal rights and nature's contributions to people: Is there a connection? *Biological Conservation*, *241*. Scopus. https://doi.org/10.1016/j.biocon.2019.108325

Jax, K., Barton, D., Chan, K., Groot, R., Doyle, U., Eser, U., Görg, C., Gómez-Baggethun, E., Griewald, Y., Haber, W., Haines-Young, R., Heink, U., Jahn, T., Joosten, H., Kerschbaumer, L., Korn, H., Luck, G., Matzdorf, B., Muraca, B., … Wichmann, S. (2013). Ecosystem services and ethics. Ecological Economics, 93, 260–268. https://doi.org/10.1016/j.ecolecon.2013.06.008

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. Scopus. https://doi.org/10.1016/j.cosust.2018.10.009

Jax, K., Furman, E., Saarikoski, H., Barton, D. N., Delbaere, B., Dick, J., Duke, G., Görg, C., Gómez-Baggethun, E., Harrison, P. A., Maes, J., Pérez-Soba, M., Saarela, S.-R., Turkelboom, F., 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, 415–427. https://doi.org/10.1016/j.ecoser.2017.08.001

Jones, K., & Tobin, D. (2018). Reciprocity, redistribution and relational values: Organizing and motivating sustainable agriculture. *Current Opinion in Environmental Sustainability*, *35*, 69–74. Scopus. https://doi.org/10.1016/j.cosust.2018.11.001

Jones, R., Rigg, C., & Lee, L. (2010). Haida Marine Planning: First Nations as a Partner in Marine Conservation. *Ecology and Society*, *15*(1), art12. https://doi.org/10.5751/ES-03225-150112

Kahle, L. R., Poulos, B., & Sukhdial, A. (1988). Changes in social values in the United States during the past decade. Journal of Advertising Research, 28(1), 35–41.

Kahn Jr., P. H. (1997). Children's moral and ecological reasoning about the Prince William Sound oil spill. *Developmental Psychology*, *33*(6), 1091–1096. Scopus. https://doi.org/10.1037/0012-1649.33.6.1091

Kahn Jr., P. H., & Lourenço, O. (2002). Water, air, fire, and earth: A developmental study in Portugal of environmental moral reasoning. *Environment and Behavior*, *34*(4), 405–430. Scopus. https://doi.org/10.1177/00116502034004001

Kant, I. (2011). Immanuel Kant: Groundwork of the Metaphysics of Morals: A German–English edition. Cambridge University Press. https://doi.org/10.1017/CBO9780511973741

Kelbessa, W. (2005). The Rehabilitation of Indigenous Environmental Ethics in Africa. Diogenes, 52(3), 17–34. https://doi.org/10.1177/0392192105055167

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. K., Ives, C. D., Hejnowicz, A. P., Gunton, R., Horcea-Milcu, A.-I., Kendal, D., Kronenberg, J., Massenberg, J. R., 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. Scopus. https://doi.org/10.1007/s11625-019-00726-4

Kenter, J. O., Reed, M. S., Irvine, K. N., O'Brien, L., Brady, E., Bryce, R., Christie, M., Church, A., Cooper, N., Davies, A., Hockley, N., Fazey, I., Jobstvogt, N., Molloy, C., Orchard-Webb, J., Ravenscroft, N., Ryan, M., & Watson, V. (2014). UK National Ecosystem Assessment follow-on phase. Work Package Report 6: Shared, plural and cultural values of ecosystems. UNEP-WCMC.

Kenter, Jasper O, O'Brien, L., Hockley, N., Ravenscroft, N., Fazey, I., Irvine, K. N., Reed, M. S., Christie, M., Brady, E., Bryce, R., Church, A., Cooper, N., Davies, A., Evely, A., Everard, M., Fish, R., Fisher, J. A., 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

Kimmerer, R. (2011). Restoration and Reciprocity: The Contributions of Traditional Ecological Knowledge. In D. Egan, E. Hjerpe, & J. Abrams (Eds.), Human Dimensions of Ecological Restoration. Integrating Science, Nature, and Culture. Island Press. https://doi.org/10.5822/978-1-61091-039-2_18

King, R. J. H. (2006). Playing with boundaries: Critical reflections on strategies for an environmental culture and the promise of civic environmentalism. *Ethics, Place and Environment*, *9*(2), 173–186. Scopus. https://doi.org/10.1080/13668790600694576

Kitayama, S. (2002). Culture and basic psychological processes—Toward a system view of culture: Comment on Oyserman et al. (2002). Psychological Bulletin, 128(1), 89–96. https://doi.org/10.1037/0033-2909.128.1.89

Kitheka, B. M., Baldwin, E. D., & Larson, L. R. (2019). Romanticism in urban landscapes: Parks, tourism, and the rebirth of Chattanooga, Tennessee. *Tourism Geographies*. Scopus. https://doi.org/10.1080/14616688.2019.1618904

Klain, S. C., Olmsted, P., Chan, K. M. A., & Satterfield, T. (2017). Relational values resonate broadly and differently than intrinsic or instrumental values, or the New Ecological Paradigm. *PLoS ONE*, *12*(8). Scopus. https://doi.org/10.1371/journal.pone.0183962

Knudtson, P., & Suzuki, D. (2006). Wisdom of the Elders: Native and scientific ways of knowing about nature. (Second edition). Stoddart.

Kohler, F., Holland, T. G., Kotiaho, J. S., Desrousseaux, M., & Potts, M. D. (2019). Embracing diverse worldviews to share planet Earth. *Conservation Biology*, *33*(5), 1014–1022. Scopus. https://doi.org/10.1111/cobi.13304

Kothari, A., & Bajpai, S. (2017). We Are the River, the River Is Us. 37, 8.

Krebs, A. (1997). Naturethik: Grundtexte der gegenwärtigen tier- und ökoethischen Diskussion (1. Aufl). Suhrkamp.

Lau, J. D., Hicks, C. C., Gurney, G. G., & Cinner, J. E. (2019). What matters to whom and why? Understanding the importance of coastal ecosystem services in developing coastal communities. *Ecosystem Services*, *35*, 219–230. Scopus. https://doi.org/10.1016/j.ecoser.2018.12.012

Lenzi, D. (2017). Relativism, Ambiguity and the Environmental Virtues. Environmental Values, 26(1), 91–109. https://doi.org/10.3197/096327117X14809634978636

Lockwood, M. (1999). Humans valuing nature: Synthesising insights from philosophy, psychology and economics. *Environmental Values*, *8*(3), 381–401. Scopus. https://doi.org/10.3197/096327199129341888

Londoño, C. (2003). Paths of Speech: Symbols, Sociality and Subjectivity among the Muinane of the Colombian Amazon. Ethnologies, 25(2), 173–194. https://doi.org/10.7202/008053ar

Loreau, M. (2014). Reconciling utilitarian and non-utilitarian approaches to biodiversity conservation. *Ethics in Science and Environmental Politics*, *14*(1), 27–32. Scopus. https://doi.org/10.3354/esep00149

Macas, L. (2010). El Sumak Kawsay. Revista Yachaykuna, 13, 13–39.

Manfredo, M., Teel, T., Gavin, M., & Fulton, D. (2014). Considerations in Representing Human Individuals in Social-Ecological Models. In M. Manfredo, J. Vaske, A. Rechkemmer, & E. Duke (Eds.), Understanding Society and Natural Resources (pp. 137–158). Springer.

Marshall, N., Adger, W. N., Benham, C., Brown, K., I Curnock, M., Gurney, G. G., Marshall, P., L Pert, P., & Thiault, L. (2019). Reef Grief: Investigating the relationship between place meanings and place change on the Great Barrier Reef, Australia. *Sustainability Science*, *14*(3), 579–587. Scopus. https://doi.org/10.1007/s11625-019-00666-z

Martinez-Alier, J. (2001). Environmental Valuation Conflicts , Environmental. Just Sustainabilities: Development in an Unequal World. https://doi.org/10.1.1.506.8735
Martinez-Alier, J. (2009). Social Metabolism, Ecological Distribution Conflicts, and Languages of Valuation. Capitalism Nature Socialism, 20(1), 58–87. https://doi.org/10.1080/10455750902727378
May Jr, R. H. (2017). Pachasophy: Landscape Ethics in the Central Andes Mountains of South America. *Environmental Ethics*, *39*(3), 301–319. Academic Search Premier.
McGregor, D. (2010). Honouring Our Relations: An Anishnaabe Perspective on Environmental Justice. In Speaking for Ourselves: Environmental Justice in Canada.
McShane, K. (2007). Why environmental ethics shouldn't give up on intrinsic value. Environmental Ethics, 29(1), 43–61. https://doi.org/10.5840/enviroethics200729128
Millennium Ecosystem Assessment (Ed.). (2005). Ecosystems and human well-being: Synthesis. Island Press.
Minteer, B. A., Corley, E. A., & Manning, R. E. (2004). Environmental ethics beyond principle? The case for a pragmatic contextualism. *Journal of Agricultural and Environmental Ethics*, *17*(2), 131–156. Scopus. https://doi.org/10.1023/B:JAGE.0000017392.71870.1f
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
Muraca, B. (2016). Re-appropriating the Ecosystem Services concept for a decolonization of "nature." In Nature and Experience—Phenomenology and the Environment. (pp. 143–156).
Naess, A. (1988). Deep Ecology and Ultimate Premises. Ecologist, 18(4–5), 128–131.
Nemogá, G. (2019). Indigenous Agrobiodiversity and Governance. In K. Zimmerer & S. de Haan (Eds.), Agrobiovidersity: Intergrating Knowledge for a Sustainable Future (pp. 241–264). MIT Press.
Newen, A., De Bruin, L., & Gallagher, S. (Eds.). (2018). The Oxford Handbook of 4E Cognition. Oxford University Press.
Ngouhouo Poufoun, J., Abildtrup, J., Sonwa, D. J., & Delacote, P. (2016). The value of endangered forest elephants to local communities in a transboundary conservation landscape. *Ecological Economics*, *126*, 70–86. https://doi.org/10.1016/j.ecolecon.2016.04.004
Norgaard, K. M., Reed, R., & Bacon, J. M. (2017). How Environmental Decline Restructures Indigenous Gender Practices: What Happens to Karuk Masculinity When There Are No Fish? *Sociology of Race and Ethnicity*, *4*(1), 98–113. https://doi.org/10.1177/2332649217706518
Norton, B. G. (1991). Toward unity among environmentalists. Oxford University Press.
Norton, B. G. (2005). Sustainability: A Philosophy of Adaptive Ecosystem Management (J O'Neill, Ed.). University of Chicago Press. https://doi.org/10.2980/1195-6860(2006)13[565:SAPOAE]2.0.CO;2
Nussbaum, M. C. (2011). Capabilities, entitlements, rights: Supplementation and critique. Journal of Human Development and Capabilities. https://doi.org/10.1080/19452829.2011.541731
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. Scopus. https://doi.org/10.1007/s11625-019-00715-7
O'Neill, J., Holland, A., & Light, A. (2008). Environmental Values. Routledge.
O'Neill, John. (1992). The Varieties of Intrinsic Value. The Monist, 75(2), 119–137.
O'Neill, John. (1993). Ecology, Policy and Politics—Human wellbeing and the natural world. Routledge.
O'Neill, John. (2017). The price of an apology: Justice, compensation and rectification. Cambridge Journal of Economics, 41, 1043–1059. https://doi.org/10.1093/cje/bew047
Oba, G., Byakagaba, P., & Angassa, A. (2008). Participatory monitoring of biodiversity in East African grazing lands. *Land Degradation & Development*, *19*(6), 636–648. https://doi.org/10.1002/ldr.867

Öhman, J., Öhman, M., & Sandell, K. (2016). Outdoor recreation in exergames: A new step in the detachment from nature? *Journal of Adventure Education and Outdoor Learning*, *16*(4), 285–302. Scopus. https://doi.org/10.1080/14729679.2016.1147965

Ott, K. (2016). On the Meaning of Eudemonic Arguments for a Deep Anthropocentric Environmental Ethics. New German Critique, 43(2 128), 105–126. https://doi.org/10.1215/0094033X-3511895

Ott, K., & Döring, R. (2008). Theorie und Praxis starker Nachhaltigkeit. Beiträge Zur Theorie Und Praxis Starker Nachhaltigkeit.

Pacari, N. (2009). Naturaleza y territorio desde la mirada de los pueblos indigenas. In A. Acosta & E. Martínez (Eds.), Derechos de la naturaleza: El futuro es ahora (pp. 31–37).

Page, E. A. (2007). Intergenerational justice of what: Welfare, resources or capabilities? Environmental Politics, 16(3), 453–469. https://doi.org/10.1080/09644010701251698

Pascual, U., Balvanera, P., Diaz, 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., Asah, S. T., … Yagi, N. (2017). Valuing nature's contributions to people: The IPBES approach. Current Opinion in Environmental Sustainability, 26–27, 7–16. https://doi.org/10.1016/j.cosust.2016.12.006

Pearson, R. G. (2016). Reasons to Conserve Nature. *Trends in Ecology and Evolution*, *31*(5), 366–371. Scopus. https://doi.org/10.1016/j.tree.2016.02.005

Polasky, S., Johnson, K., Keeler, B., Kovacs, K., Nelson, E., Pennington, D., Plantinga, A. . J., & Withey, J. (2012). Are investments to promote biodiversity conservation and ecosystem services aligned? *Oxford Review of Economic Policy*, *28*(1), 139–163. Scopus. https://doi.org/10.1093/oxrep/grs011

Popa, F., & Guillermin, M. (2017). Reflexive Methodological Pluralism: The Case of Environmental Valuation. Journal of Mixed Methods Research, 11(1), 19–35. https://doi.org/10.1177/1558689815610250

Pradhan, K. (2018). Exploration and Extrapolation of Extension Strategy for Promotion of Spice Production and Processing in India. In A. B. Sharangi (Ed.), *Indian Spices* (pp. 421–438). Springer International Publishing. https://doi.org/10.1007/978-3-319-75016-3_16

Purdy, D. H., Hadley, D. J., Kenter, J. O., & Kinch, J. (2017). Sea Cucumber Moratorium and Livelihood Diversity in Papua New Guinea. Coastal Management, 45(2), 161–177. https://doi.org/10.1080/08920753.2017.1278147

Ranger, S., Kenter, J. O., Bryce, R., Cumming, G., Dapling, T., Lawes, E., & Richardson, P. B. (2016). Forming shared values in conservation management: An interpretive-deliberative-democratic approach to including community voices. Ecosystem Services, 21, 344–357. https://doi.org/10.1016/j.ecoser.2016.09.016

Raymond, C. M., Giusti, M., & Barthel, S. (2018). An embodied perspective on the co-production of cultural ecosystem services: Toward embodied ecosystems. *Journal of Environmental Planning and Management*, *61*(5–6), 778–799. Scopus. https://doi.org/10.1080/09640568.2017.1312300

Raymond, C.M., & Kenter, J. O. (2016). Transcendental values and the valuation and management of ecosystem services. Ecosystem Services, 21. https://doi.org/10.1016/j.ecoser.2016.07.018

Raymond, Christopher M., Fazey, I., Reed, M. S., Stringer, L. C., Robinson, G. M., & Evely, A. C. (2010). Integrating local and scientific knowledge for environmental management. Journal of Environmental Management, 91(8), 1766–1777. https://doi.org/10.1016/j.jenvman.2010.03.023

Reed, M. S., & Ceno, J. S. D. (2015). Mediation and conservation conflicts: From top-down to bottom-up. In *Conflicts in Conservation: Navigating Towards Solutions* (pp. 226–239). Scopus. https://doi.org/10.1017/9781139084574.017

Regan, T. (1983). The case for animal rights. University of California Press.

Regan, T. (1986). The Case for Animal Rights. In M. Fox & L. Mickley (Eds.), Advances in animal welfare science (p. 12). The Humane Society of the United States.

Regan, T. (1992). Does environmental ethics rest on a mistake? *Monist*, *75*(2), 161. Academic Search Premier.

Reyers, B., Polasky, S., Tallis, H., Mooney, H. A., & Larigauderie, A. (2012). Finding common ground for biodiversity and ecosystem services. *BioScience*, *62*(5), 503–507. Scopus. https://doi.org/10.1525/bio.2012.62.5.12

Rico García-Amado, L., Ruiz Pérez, M., & Barrasa García, S. (2013). Motivation for conservation: Assessing integrated conservation and development projects and payments for environmental services in La Sepultura Biosphere Reserve, Chiapas, Mexico. *Ecological Economics*, *89*, 92–100. Academic Search Premier.

Rokeach, M. (1973). The nature of human values.

Rolston, H. (1994). Environmental Ethics: Values in and Duties to the Natural World. In Reflecting on Nature: Readings in Environmental Philosophy.

Rolston, H. I. (1993). Rights and responsibilities on the home planet. *Zygon®*, *28*(4), 425–439. Scopus. https://doi.org/10.1111/j.1467-9744.1993.tb01047.x

Ross, H., Witt, K., & Jones, N. A. (2018). Stephen Kellert's development and contribution of relational values in social-ecological systems. *Current Opinion in Environmental Sustainability*, *35*, 46–53. https://doi.org/10.1016/j.cosust.2018.10.007

Ruiz, P. O., & Sánchez, E. R. (2009). The ethical dimension of the environment crisis. Pedagogic proposals. *Teoria de La Educacion*, *21*(1), 161–178. Scopus.

Sagoff, M. (2009). Intrinsic value: A reply to Justus et al. Trends in Ecology and Evolution. https://doi.org/10.1016/j.tree.2009.07.005

Sakakibara, C. (2009). "No whale, no music": Iñupiaq drumming and global warming. Polar Record. https://doi.org/10.1017/S0032247408008164

Sandberg, M., & Jakobsson, S. (2018). Trees are all around us: Farmers' management of wood pastures in the light of a controversial policy. *Journal of Environmental Management*, *212*, 228–235. https://doi.org/10.1016/j.jenvman.2018.02.004

Sandler, R. L. (2007). Character and environment: A virtue-oriented approach to environmental ethics. Columbia University Press. https://www.jstor.org/stable/10.7312/sand14106

Saner, M. A., & Bordt, M. (2016). Building the consensus: The moral space of earth measurement. *Ecological Economics*, *130*, 74–81. https://doi.org/10.1016/j.ecolecon.2016.06.019

Sarkki, S., Ficko, A., Miller, D., Barlagne, C., Melnykovych, M., Jokinen, M., Soloviy, I., & Nijnik, M. (2019). Human values as catalysts and consequences of social innovations. *Forest Policy and Economics*, *104*, 33–44. Scopus. https://doi.org/10.1016/j.forpol.2019.03.006

Saxena, A. K., Chatti, D., Overstreet, K., & Dove, M. R. (2018). From moral ecology to diverse ontologies: Relational values in human ecological research, past and present. *Current Opinion in Environmental Sustainability*, *35*, 54–60. https://doi.org/10.1016/j.cosust.2018.10.021

Sayer, A. (2011). Why things matter to people: Social science, values and ethical life. https://doi.org/10.1017/CBO9780511734779

Schnegg, M., Rieprich, R., & Pröpper, M. (2014). Culture, Nature, and the Valuation of Ecosystem Services in Northern Namibia. *Ecology and Society*, *19*(4), art26. https://doi.org/10.5751/ES-06896-190426

Schröter, M., Başak, E., Christie, M., Church, A., Keune, H., Osipova, E., Oteros-Rozas, E., Sievers-Glotzbach, S., van Oudenhoven, A. P. E., Balvanera, P., González, D., Jacobs, S., Molnár, Z., Pascual, U., & Martín-López, B. (2020). Indicators for relational values of nature's contributions to good quality of life: The IPBES approach for Europe and Central Asia. *Ecosystems and People*, *16*(1), 50–69. Scopus. https://doi.org/10.1080/26395916.2019.1703039

Schulz, C., & Martin-Ortega, J. (2018). Quantifying relational values—Why not? Current Opinion in Environmental Sustainability, 35, 15–21. Scopus. https://doi.org/10.1016/j.cosust.2018.10.015

Schwartz, S. H. (1994). Are There Universal Aspects in the Structure and Contents of Human Values? Journal of Social Issues. https://doi.org/10.1111/j.1540-4560.1994.tb01196.x
Shanee, N. (2013). Campesino justification for self-initiated conservation actions: A challenge to mainstream conservation. *Journal of Political Ecology*, *20*, 413–428.
Silverblatt, I. M. (1987). Moon, Sun, and Witches: Gender Ideologies and Class in Inca and Colonial Peru. Princeton University Press.
Singer, P. (1975). Animal Liberation. Harper Collins Publishers.
Skubel, R. A., Shriver-Rice, M., & Maranto, G. M. (2019). Introducing relational values as a tool for shark conservation, science, and management. *Frontiers in Marine Science*, *6*(FEB). Scopus. https://doi.org/10.3389/fmars.2019.00053
Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014). An Integrated Framework for Encouraging Pro-environmental Behaviour: The role of values, situational factors and goals. Journal of Environmental Psychology, 38, 104–115. https://doi.org/10.1016/j.jenvp.2014.01.002
Stenseke, M. (2018). Connecting "relational values" and relational landscape approaches. *Current Opinion in Environmental Sustainability*, *35*, 82–88. https://doi.org/10.1016/j.cosust.2018.10.025
Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. Human Ecology Review, 6(2), 81–97. https://doi.org/10.2307/2083693
Stolte, J. F., & Fender, S. (2007). Framing Social Values: An Experimental Study of Culture and Cognition. Social Psychology Quarterly, 70(1), 59–69. https://doi.org/10.1177/019027250707000107
Storrie, R. (1999). Being Human: Personhood, cosmology and subsistence for the Hoti of Venezuelan Guiana. [PhD Thesis]. University of Manchester.
Taylor, P. (1986). Respect for Nature. A Theory of Environmental Ethics. Princeton University Press.
TEEB. (2010). Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of TEEB. UNEP.
TEEB. (2012). TEEB. https://doi.org/10.4324/9781849775489
Tola, M. (2018). Between Pachamama and Mother Earth: Gender, Political Ontology and the Rights of Nature in Contemporary Bolivia. Feminist Review, 118(1), 25–40. https://doi.org/10.1057/s41305-018-0100-4
Tronto, J. C. (1993). Moral Boundaries: A Political Argument for an Ethic of Care. In Moral Boundaries: A Political Argument for an Ethic of Care. https://doi.org/10.1016/j.conbuildmat.2015.02.078
UK National Ecosystem Assessment. (2014). UK National Ecosystem Assessment follow-on phase: Synthesis Report. UNEP-WCMC.
UN. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. United Nations. https://doi.org/10.1891/9780826190123.ap02
van den Born, R. J. G., Arts, B., Admiraal, J., Beringer, A., Knights, P., Molinario, E., Horvat, K. P., Porras-Gomez, C., Smrekar, A., Soethe, N., Vivero-Pol, J. L., Ganzevoort, W., Bonaiuto, M., Knippenberg, L., & De Groot, W. T. (2018). The missing pillar: Eudemonic values in the justification of nature conservation. Journal of Environmental Planning and Management, 61(5–6), 841–856. https://doi.org/10.1080/09640568.2017.1342612
van der Ploeg, J., Cauillan-Cureg, M., van Weerd, M., & Persoon, G. (2011). 'Why must we protect crocodiles?' Explaining the value of the Philippine crocodile to rural communities. *Journal of Integrative Environmental Sciences*, *8*(4), 287–298. Academic Search Premier.
van Riper, C., Winkler-Schor, S., Foelske, L., Keller, R., Braito, M., Raymond, C., Eriksson, M., Golebie, E., & Johnson, D. (2019). Integrating multi-level values and pro-environmental behavior in a U.S. protected area. Sustainability Science, 1–14. https://doi.org/10.1007/s11625-019-00677-w

Verhoog, H., Lammerts Van Bueren, E. T., Matze, M., & Baars, T. (2007). The value of "naturalness" in organic agriculture. *NJAS - Wageningen Journal of Life Sciences*, *54*(4), 333–345. Scopus. https://doi.org/10.1016/S1573-5214(07)80007-8

Vilaça, A. (2008). Conversão, predação e perspectiva. Mana, 14(1), 173–204. https://doi.org/10.1590/S0104-93132008000100007

Viveiros De Castro, E. (2004). Perspectival Anthropology and the Method of Controlled Equivocation. Tipitı : Journal of the Society for the Anthropology of Lowland South America, 2(21), 3–22.

West, S., Haider, L. J., Masterson, V., Enqvist, J. P., Svedin, U., & Tengö, M. (2018). Stewardship, care and relational values. Current Opinion in Environmental Sustainability. https://doi.org/10.1016/j.cosust.2018.10.008

Weston, A. (1985). Beyond intrinsic value: Pragmatism in environmental ethics. Environmental Ethics, 7(4).

Whitehead, A. N. (1966). Modes of Thought (MT). The Free Press.

Whyte, K. (2018a). Food sovereignty, justice, and indigenous peoples: An essay on settler colonialism and collective continuance. In The Oxford Handbook of Food Ethics. https://doi.org/10.1093/oxfordhb/9780199372263.013.34

Whyte, K. (2018b). Settler Colonialism, Ecology, and Environmental Injustice. Environment and Society. https://doi.org/10.3167/ares.2018.090109

Whyte, K. (2018c). Critical Investigations of Resilience: A Brief Introduction to Indigenous Environmental Studies & Sciences. Daedalus, 147(2), 136–147. https://doi.org/10.1162/DAED_a_00497

Winkler, K. J., & Hauck, J. (2019). Landscape stewardship for a German UNESCO Biosphere Reserve: A network approach to establishing stewardship governance. *Ecology and Society*, *24*(3), 12. https://doi.org/10.5751/ES-10982-240312

Witt, K., Ross, H., Shaw, S., Jones, N., Rissik, D., & Pinner, B. (2019). How do Local People Value Rural Waterways? A Study in the Upper Catchments of South East Queensland's Rivers. *Society & Natural Resources*, *32*(6), 638–656. https://doi.org/10.1080/08941920.2019.1578910

Zent, E L. (2014a). Ecogonía II. Visiones alternativas de la biosfera en la América indígena ¿Utopia o continuum de una noción vital? Etnoecológica, 10(7).

Zent, E L. (2014b). Ecogonía iii. Jkyo Jkwaini: La filosofia del ciudado de la vida de los joti del amazonas venezolano. Etnoecológica.

Zent, Egleé L. (2008). El yo-cazador: Perforaciones, prescripciones y seres primordiales de los jodï de la Guayana. Amazonia Peruana, 30, 111–140.

Zent, Eglee L. (2013). Insight: How the Joti concept of kyo jkaini could help the West live sustainably.

Zent, Egleé L. (2013). Jotï ecogony, Venezuelan Amazon. Environmental Research Letters, 8(1), 015008–015008. https://doi.org/10.1088/1748-9326/8/1/015008

Zhang, X., Yu, X., Zhang, Z., Xu, Z., Xu, S., & Xu, B. (2013). Ecosystem service values of wetlands of the national wetland park of Wu river, Northern China. *Forestry Chronicle*, *89*(2), 147–152. Scopus. https://doi.org/10.5558/tfc2013-031

Annex 2.11 Diverse perspectives on fisheries[12]

Introduction

The coastal and marine systems that support the world's fisheries have been shaped by interlinked human and ecological elements, resulting in social-ecological systems (SES) that contribute to human wellbeing in diverse and profound ways. While of global importance for livelihoods and nutrition, a narrow focus on these aspects of fisheries misses the multiple and diverse suite of values shaped by different worldviews and perspectives. Yet conceptualizing this diversity and ensuring that it is the foundation for decision making and management efforts is a key challenge for understanding the nature and potential of fisheries in a rapidly changing world.

Objective(s) (including relevance to policy)

To provide a rapid assessment of the extent to which diverse perspectives on fisheries are reflected in the scientific literature, and how this has aligned with decision-making tools for management of fisheries.

Methods

This annex draws directly on a knowledge base of scientific publications (n = 142) focused on fisheries that were assembled within the context of the High-Level Panel for a Sustainable Ocean Economy, established in 2018. Most of these publications could be readily accessed (n=128), while the remainder were unavailable and were excluded from the following analysis. The sources cover environmental aspects of fisheries, as well as social and legal aspects and refer to most FAO fishing areas, while others address global issues (see *Figure SM2.11*). The sources were collected, analysed and coded using the MaxQDA2020 software, according to the codes shown in *Table SM2.7*. The codes were chosen in a collaboration between *chapter 2* and *chapter 4* authors of the IPBES values assessment and the contributing authors. The findings presented in this annex are based on the analysis using these codes.

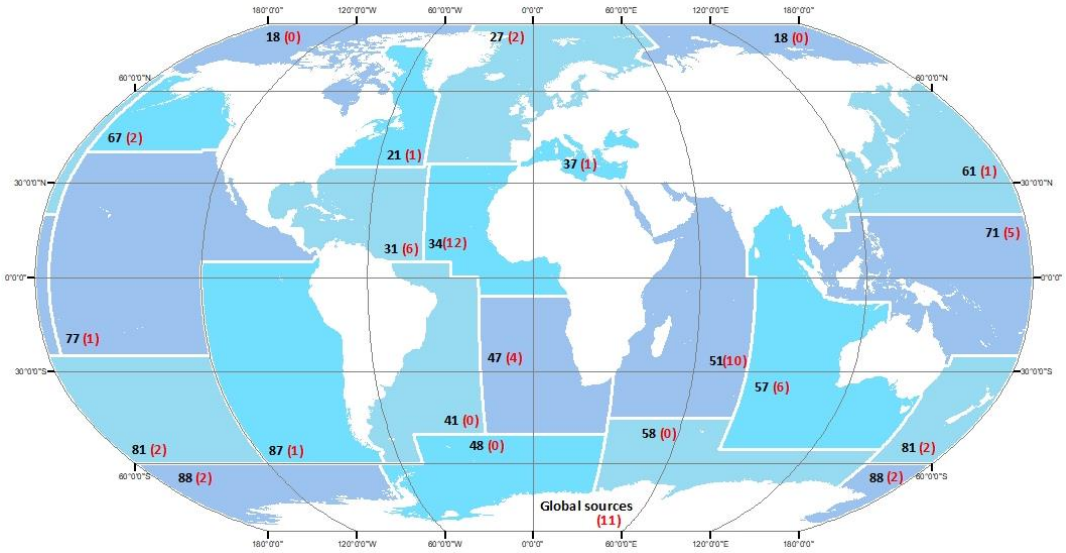

Figure SM2.11 Number of sources mentioning a specific FAO fishing area (noted in red within each area). Eleven sources didn't refer to a FAO fishing area but referred instead to fishing in a global context. (Source: FAO, 2008, adapted by the authors).

[12] Literature review on the diverse perspectives on fisheries at the global scale (https://doi.org/10.5281/zenodo.4399386).

Only specific parts of each source were coded. In the case of multilateral and non-academic sources, only the executive summaries and conclusions were coded. In scientific papers, the abstract, discussion and conclusion were coded.

Table SM2.7 Codes used to analyse the sources.

Publication identification	Numbers 1 through 128
Reference	Bibliographic citation
Fishery type	Freshwater, coastal, pelagic
The scale of valuation	Local, sub-national, cross-national, national, above national
Location	Specific site
Region	The 19 FAO fishing areas
Worldviews present	Anthropocentric, biocentric, ecocentric, polycentric
Broad values present	Moral principles and other life goals, such as prosperity, human welfare, health, life enjoyment, belonging, sustainability, justice, reciprocity, responsibility
Specific values present	Instrumental, relational, intrinsic
Value indicators used	Biophysical, socio-cultural, monetary
Other value types (TEEB+)	Use (direct, indirect, option), non-use (bequest, altruistic, existence)
Decision-making typology	Economic, political, socio-environmental (or socio-cultural), which occur in private, public and civil spheres
Documentation of valuation uptake by stakeholders	No documented uptake, cursory reference to uptake, documented uptake.
Valuation purpose	Informative, decisive, technical
Power dynamics	Discursive, framing, rule-making, interaction, material
Valuation method	Nature-based, statement-based, behaviour-based, integration
Valuation targets	Nature, material NCP, non-material NCP, regulating NCP, quality of life
Stakeholders involved	Public, private, civil society
Typology of a decision in fisheries	Political decisions, economic decisions, socio-environmental decisions
Justice	Distributional, procedural, recognitional
Context for fisheries decision-making	Indigenous, local, national, regional, global
Equity	Gender, intergenerational, access, impact burden
Knowledge Types into Fisheries decision-making (Tengö, 2014)	Indigenous and local knowledge (ILK), natural science, social science, technical knowledge, practitioners knowledge
Discourse behind fisheries decision-making	blue economy/growth, place-based management, ecosystem Services/nature contributions to people (ES/NCP)
Fisheries decision-making tools (Selig 2017)	Quota, ABMTs, gear restriction, time-area closure
Narratives in transboundary fisheries	foreign fleets, multilateral cooperation, sovereignty claims
The legitimacy of fisheries regulations (Pinkerton 2019)	scientific legitimacy, regulatory, political, moral
Certification/management outcomes (related to valuation targets above, but evidence specific to measured outcomes of management decisions)	Nature (e.g., fish population, diversity), NCP (fish catch, catch per unit effort), Quality of life (income, jobs, nutrition/health, poverty, conflicts, etc.), Institutions (formation of new networks, governance mechanisms, community cohesiveness, etc.)

Summary of results

Worldviews and broad values in fisheries

Fisheries represent one of the oldest livelihoods and have always been shaped by social, economic and environmental processes. In this context, the dominant worldview in the fisheries literature

reviewed in this work (n= 128) is anthropocentrism, approached from angles of conflict and corruption, livelihoods, food security, poverty and governance. However, fisheries permeate diverse aspects of human existence, so the nuances of anthropocentric framings will be further discussed, especially concerning relational values.

Sustainability as a "broad value" is the prevalent framing within the reviewed literature, with explicit reference in 28% of the documents. This framing describes both actual and aspirational approaches to fisheries management in small-scale fisheries (SSF) and industrial fisheries, and it is used in its broadest sense encompassing socioeconomic and environmental dimensions. Human welfare (18%), in connection with health, is frequently described for SSF, encompassing multiple dimensions of wellbeing, including nutrition, eradication of poverty, access to cash, education and infrastructure (Allison 2012).

Responsibility (8%) is a value associated with the highest levels of fisheries value chains, especially in the context of responsible seafood consumption from both retailers and consumers (Levin 2018). Community Supported Fisheries (CSF) programs in the US aim to promote responsible consumption by prioritizing local products as a way to counteract massive consumption of imported seafood, which reached 84% in 2009, threatening local and cooperative producers in the country (Brinson et al. 2011). In other cases, notions of responsibility are represented through the use of Stewardship values often mentioned in the context of SSF, for instance, in the case of Territorial Use Rights for Fishing (TURFs) in Chile (Gelcich 2019).

Special attention is given to Justice (15%) as a broad value throughout the fisheries literature since it is relevant for both industrial fishing and SSF, but also within and among multiple governance scales: from households (Fröcklin 2013) to transboundary scales (Hanich 2015). (In)justice is a cross-cutting issue that affects multiple social-ecological dimensions and determines power structures that condition trajectories of resource use and human wellbeing. In practice, it is expected that dimensions of justice are interlinked, as recognition (or lack thereof) and marginalization of societal groups, knowledge, and/or value systems can result in imbalanced distributions of benefits and burdens.

Distributional justice (*Figure SM2.12*) is the most recurrent dimension of justice (33%) because, in its broadest sense, it highlights issues of access to and distribution of resources that sit at the core of most fisheries sustainability challenges. As such, access to resources determines the availability of space and quotas, capital, markets, subsidies etc (Bennett et al.2018, Fröcklin 2013, Schuhbauer 2017). A salient topic in distributional justice of fisheries is the management regime of Rights Based Fisheries, which ultimately determines who, where, when and how much different stakeholders engage in fishing activities. Although there are several alternatives for implementation, it ultimately relies on exclusionary principles as the most suitable route to break poverty in SSF (Allison 2012). Aspects like access to capital can influence distributional justice and severely impact the wellbeing of some societal groups (Bennett, 2018).

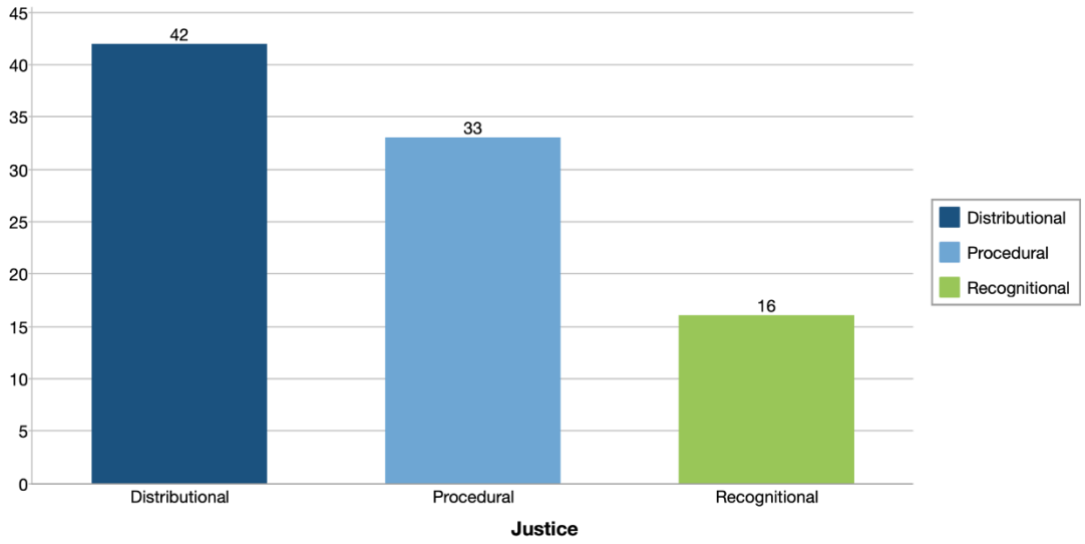

Figure SM2.12 Justice. This figure shows how many sources were coded as referring to justice. The y-axis shows the number of sources, and the x-axes the three different types of codes.

Women in fishing communities in Zanzibar are consistently restricted from accessing start-up capital that would help to break entry barriers into fishing, and unpaid housework imposes time constraints that hamper collective gathering and networking. This, in turn, limits their access to fish resources and the associated benefits, while unequally distributing the socioeconomic burden between genders (Fröcklin 2013). At the sector scale, SSF also face distributional (in)justice through unequal allocation of fishing subsidies compared to the industrial fishing sector, which receives 4X the value/capita in capacity enhancing subsidies, which ultimately enhance overfishing and reinforce poverty in SSF (Schuhbauer 2017).

As justice imbalances deepen marginalization of societal groups, power asymmetries (*Figure SM2.13*) become prevalent within and among their members. Interaction asymmetries emerged most frequently, represented by complex and dynamic interplays between diverse stakeholder groups. An expanded notion of intersectionality (Crenshaw, 2017) helps in explaining the array of social factors that interconnect to increase power asymmetries in the fisheries sector.

Pervasive asymmetries by interaction include patron-client relations in SSF whereby some community members concentrate fishing assets and capital (material power) and promote unequal engagement with non-owner fisherfolk while increasing unfair competition for catch and fishing territories, ultimately eroding cooperative structures (Kaplan-Hallam 2017). Often, patrons can influence decision-making processes and act as opinion leaders who aim to disseminate (usually biased) knowledge about the state of the fisheries (Crona and Bodin 2010), thereby capitalizing on their rule-making and framing power.

Fisheries and ocean governance, in general, are guided by prominent discursive and framing narratives that respond to different broad goals and are put forward by different stakeholder groups. An example is co-management in the context of African SSF, where the main push for such shifts in natural resource management has primarily been driven by donor discourses, and despite delivering positive social-ecological outcomes, some governance and monitoring mechanisms are exerted top-down, rather than in a participatory way (Cinner 2012). More recently, the “Blue Economy” has gained traction as it accommodates goals and aspirations from different economic sectors while raising important questions about the implications of this ocean “territorialization” for artisanal fisheries subsistence and ways of life (Cohen 2019).

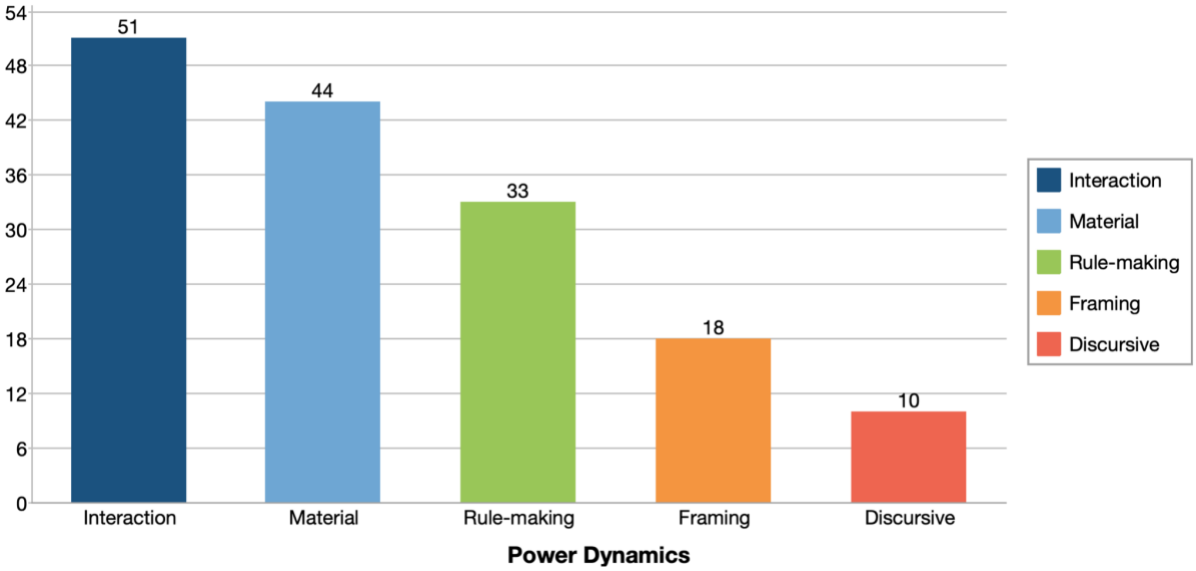

Figure SM2.13 Power Dynamics. This figure shows how many sources were coded as referring to power dynamics. The y-axis shows the number of sources, and the x-axes the five different types of codes.

Specific values in fisheries

As fishing relies mainly on the use and extraction of aquatic resources for sustaining livelihoods, it is unsurprising that nearly 45% (*Figure SM2.14*) of the documents reviewed are framed within an instrumental use of biological resources with the purpose of meeting household needs and income generation. Global population and nutritional demands continue to grow, and seafood is receiving increased attention as the dominant protein source in many parts of the world (Agnew 2009). Instrumental values associated with fisheries were mostly embedded within the Living from nature life frame present in 40% of the publications, highlighting the flow of economic and nutritional benefits from seafood.

Relational values play a significant role within the fisheries literature as they indicate the importance of fisheries beyond economic revenues. Fisheries are based on relations between fishers and: nature, community members, foreign fishers, government, NGOs, and actors with competing interests (Bavinck 2018). Societal structures, culture, and traditions of SSF are deeply anchored in the fisherfolk identity (FAO 2015), which also can create tensions in management approaches.

Relations and identity formation are normative processes and determine people's perceptions of their own and collective aspirations. This is evident, for instance, in cases where women are directly working on fishing boats along with their male counterparts but still do not identify themselves as fishers (Yodanis, 2000). Such identities are vulnerable to socio-economic dynamics and, in the case of SSF, can be severely impacted by the growing influence of aquaculture development, which creates complex questions about fish domestication and threatens the practices and knowledge associated with wild capture fisheries, which is the ultimate cultural anchor of fishing (Jaqcuet 2009).

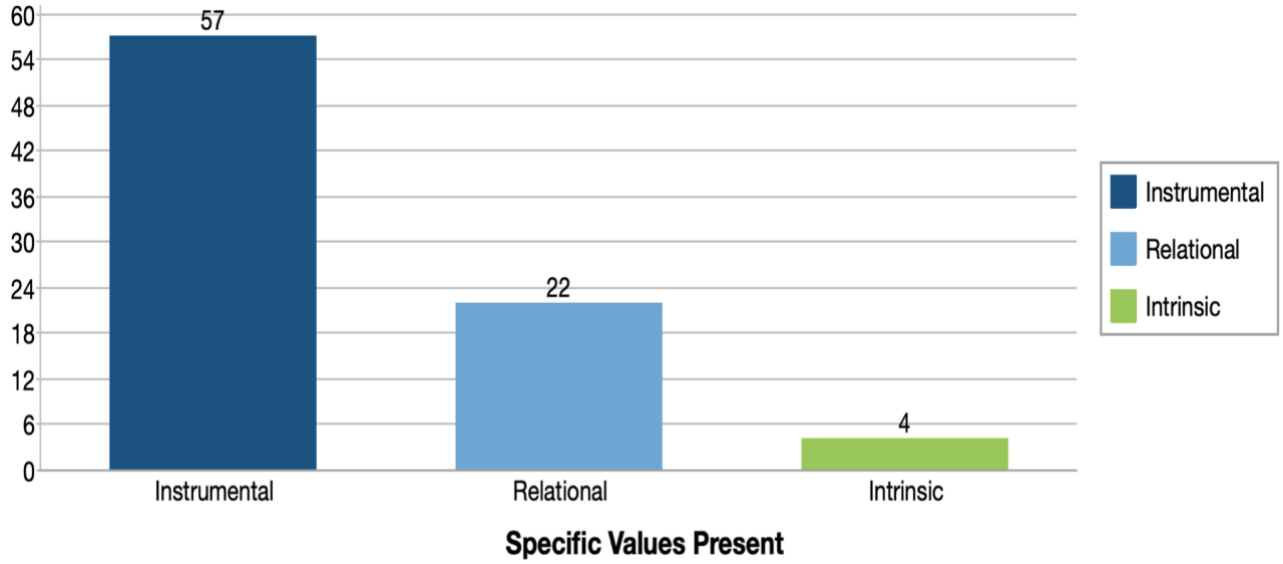

Figure SM2.14 Specific values present. This figure shows how many sources were coded as referring to specific values. The y-axis shows the number of sources, and the x-axes the three different types of codes.

Decision making in fisheries

Framings and typology behind decision making

Decision-making processes in fisheries happen continuously and across different societal scales. An increasingly popular framing is the "Blue Economy/Blue Growth" narrative behind ongoing economic efforts to capitalize on various marine resources with the promise of cascading benefits from private actors and governments down to local communities. Critical perspectives on this framing highlight risks about claimed benefits concentrating in private and foreign actors, thus reinforcing exclusion and societal struggle at the local level (Bennett et al., 2018).

Economic and political decision-making processes are given comparable attention in the fisheries literature (*Figure SM2.15*). At the local scale, the focus is on enhancing governance mechanisms to increase social and economic benefits from SSF (Allison 2012). In the industrial sector, attention is given to key aspects of fisheries value chains such as vertical integration, price volatility and distance to markets (Gagern and van der Bergh 2013). Political decision-making processes found in the literature (*Figure SM2.15*) focus on the need to strengthen legal and regulatory frameworks in ocean and coastal governance. This includes, in particular, addressing conflicts with foreign fleets, government institutions (Devlin et al.2020), and increased participation of marginalized groups (Harper et al.2017).

Socio-environmental decision making in fisheries highlights how rights-based processes in indigenous communities, when developed in connection with context-relevant visions and approaches, have the potential to strengthen self-determination capacity and improved governance as seen in cases in the Philippines, New Zealand and Canada (Allison 2012). Historical migration between Ghana and Senegal has preserved traditional knowledge on the design of pirogues suited for long-distance fishing, and in the face of stock depletion due to foreign overfishing and local extinctions, it has been a key social asset to facilitate adaptive fishing strategies to "follow the fish" further into the ocean (Belhabib 2016).

Although industrial fisheries are directly linked in cultural or local practices as described, there are decision-making processes that transcend economic or political motivations. For instance, voluntary

adoption of best practices regarding working conditions (ILO 2016) onboard fishing vessels responds to the urgent need to significantly improve human rights in the sector.

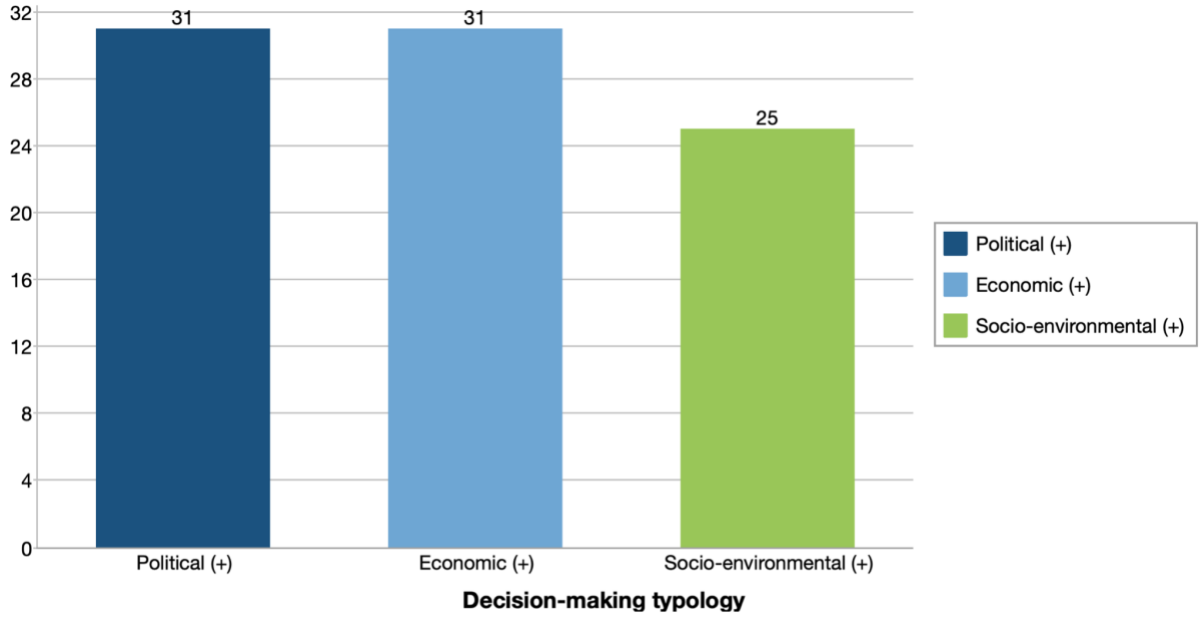

Figure SM2.15 Decision-making typology. This figure shows how many sources were coded as referring to specific values present. The y-axes shows the number of sources, and the x-axes the three different codes used.

Value targets and indicators

Fisheries values are widely acknowledged in terms of the nutritional and livelihood contributions to people around the world. This explains the dominance of Material NCP and monetary indicators as the primary valuation target, and indicators (*Figures SM2.16, SM2.17*) respectively. The most common units of fishery analysis are landing volumes, catch landed value, and catch per unit effort (Sumaila 2020). These indicators constitute the base of most stock assessments and decision-making processes in fisheries (Cisneros-Montemayor and Sumaila 2019). As a consequence, there is a high influence of technical knowledge (22%) (Tengö, 2014) that builds on complex social and ecological modelling approaches to characterize and predict resource use trends (Pauly and Zeller 2016, Sala et al 2018).

Non-material NCP and quality of life are similarly represented in the literature (*Figure SM2.16*). Community empowerment, social cohesion, and access to knowledge are featured among the valuable non-material NCP within Chilean Territorial Use Rights for Fishing (TURFs) in Chile (Gelcich, 2017), which are also foundational aspects of quality of life. Similarly, traceability is considered a valuable feature of sustainable value chains, and evidence suggests that organizations capable of attaining high levels of transparency engage in tighter interactions between customers and producers, resulting in strong incentives for sustainable seafood sourcing (Brinson 2011). Regulating NCPs are seldom addressed in the literature, but one example are bivalves and seaweed in the aquaculture sector, which are highly valuable for their role in nutrient processing and C sequestering, respectively (FAO, 2018).

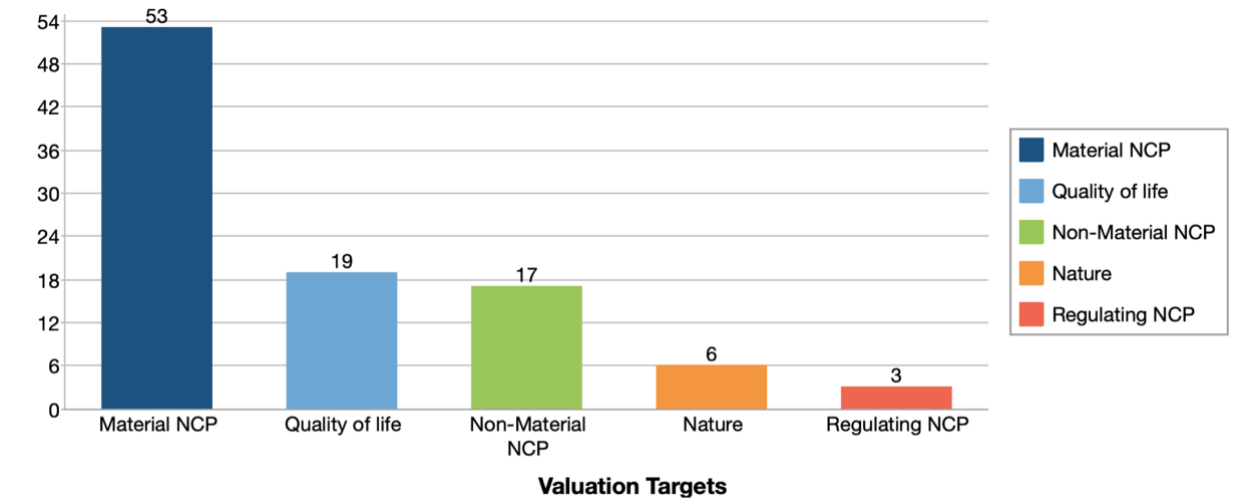

Figure SM2.16 Valuation targets. This figure shows how many sources were coded as referring to specific valuation targets. The y-axis show the number of sources, and the x-axes the five different codes used.

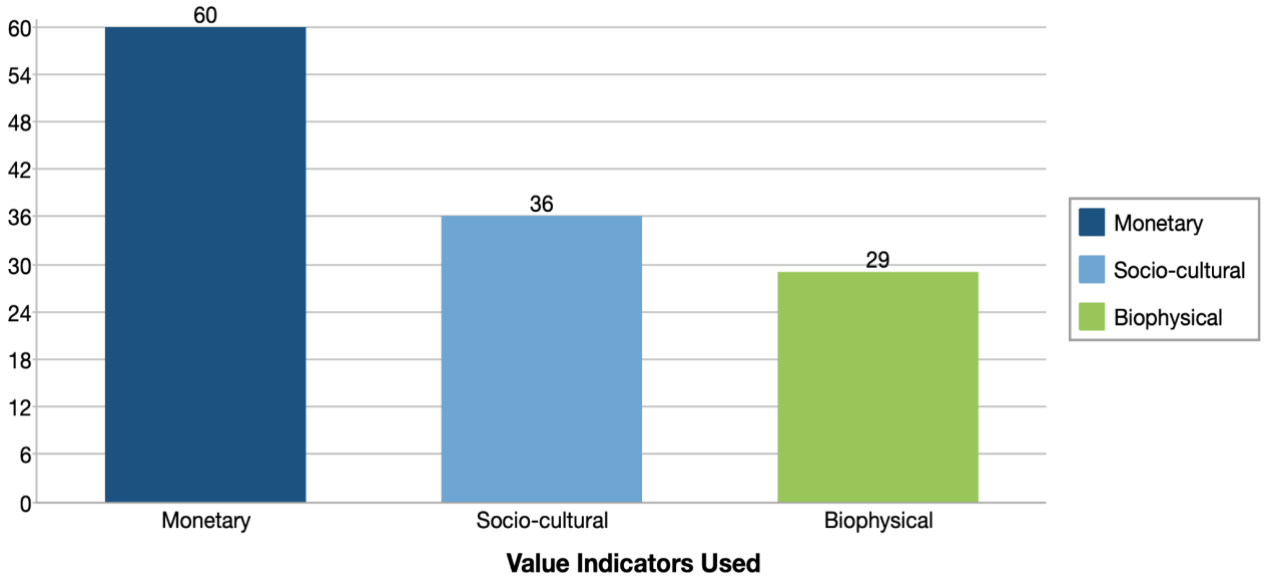

Figure SM2.17 Value indicators used. This figure shows how many sources were coded as referring to value indicators used. The y-axis shows the number of sources, and the x-axes the three different codes used.

Fisheries management outcomes and decision-making tools.

Fisheries management is influenced by interconnected ecological, social, economic and political processes, thus it demands different approaches and tools that respond to this complexity while remaining context-relevant. Decision-making tools in fisheries include, but are not limited to, individual tradable quotas (ITQ), area-based management tools, comprising a wide array of marine reserves, dynamic time-area closures and gear restrictions (Selig 2017). In connection, implementation of management programs can result in a wide array of outcomes encompassing: new or improved institutions (34% papers reviewed), NCPs (15%), quality of life (12%), Nature/Ecological properties (7%).

Indonesian Government imposed a set of strict institutional measures to curb IUU fishing including a moratorium on all foreign fishing vessels, and a requirement to activate Vessel Monitoring Systems

(VMS). This strategy has resulted in a significant reduction of foreign fishing vessels and improved fleet monitoring through VMS signals, however it has also seen a significant increase in domestic fleet impact and fishing pressure (Cabral 2018). This example suggests that top-down regulations alone can fail to deliver the expected outcomes, especially in cases in which decision-making processes ignore underlying values and motivations of actors. In this case, domestic fishers used the window of opportunity left by foreign fleets, and acted guided by a strong influence of instrumental values towards the fisheries.

Marine protected areas are a popular decision-making tool in fisheries and are highly entrenched in the aspirational narrative of marine conservation. However they are based on the premise of exclusion which can permeate within and among fisher communities and lead to gender or migrant segregation where customary traditions allowed it (Baker-Medard 2017). In cases where these rules are enforced through community-based participatory monitoring, it can deeply erode important relational values within and among communities and spark recurrent conflict.

Key Message (per plot)

- Fisheries, both small scale and industrial, complex social-ecological systems where different societal sectors interact with each other and with the natural environment. As a result, the benefits and burdens of fishing and regulations are not equally distributed among stakeholders. In order to attain equal distribution it is paramount to improve recognition and participation, and enhance the design and implementation of clear management and legal processes.

- Prevalence of distributional injustice opens the floor to profound power asymmetries that constraint social development of marginalized groups. The most common factors behind power imbalances are lack of material capital, gender, place of origin.

- Within the fisheries literature the dominant worldview is Anthropocentrism, as fishing is mainly understood as a means to satisfy human's diversity of needs. Within this view, instrumental values are featured the most due to fish's critical role in supplying nutritional needs and livelihoods all over the world. However relational values play key roles in determining fisherfolk's ways of life, aspirations and various forms of social organization.

- Most decision-making processes in fisheries occur from a political and economic perspective, and to a lesser extent socio-environmental. As a consequence, predominant indicators about fisheries values in the literature assessed focus on Material NCP valuation targets and monetary indicators to convey the values of fisheries to humanity.

- Management outcomes and decision-making tools respond to stakeholders' individual and collective values, and thus can result in different outcomes depending on the context. The literature highlights the importance of co-designing efforts such that these are context-suitable and hence able to deliver the intended social and ecological benefits.

References

Agnew, D. J., Pearce, J., Pramod, G., Peatman, T., Watson, R., Beddington, J. R., & Pitcher, T. J. (2009). Estimating the worldwide extent of illegal fishing. *PLoS ONE*, *4*(2). https://doi.org/10.1371/journal.pone.0004570

Allison, E. H., Ratner, B. D., Åsgård, B., Willmann, R., Pomeroy, R., & Kurien, J. (2012). Rights-based fisheries governance: From fishing rights to human rights. *Fish and Fisheries*, *13*(1), 14–29. https://doi.org/10.1111/j.1467-2979.2011.00405.x

Baker-Médard, M. (2017). Gendering Marine Conservation: The Politics of Marine Protected Areas and Fisheries Access. *Society and Natural Resources*, *30*(6), 723–737. https://doi.org/10.1080/08941920.2016.1257078

Bavinck, M., Jentoft, S., & Scholtens, J. (2018). Fisheries as social struggle: A reinvigorated social science research agenda. *Marine Policy*, *94*(December 2017), 46–52. https://doi.org/10.1016/j.marpol.2018.04.026

Belhabib, D., Lam, V. W. Y., & Cheung, W. W. L. (2016). Overview of West African fisheries under climate change: Impacts, vulnerabilities and adaptive responses of the artisanal and industrial sectors. *Marine Policy*, *71*, 15–28. https://doi.org/10.1016/j.marpol.2016.05.009

Bennett, N. J., Kaplan-Hallam, M., Augustine, G., Ban, N., Belhabib, D., Brueckner-Irwin, I., Charles, A., Couture, J., Eger, S., Fanning, L., Foley, P., Goodfellow, A. M., Greba, L., Gregr, E., Hall, D., Harper, S., Maloney, B., McIsaac, J., Ou, W., … Bailey, M. (2018). Coastal and Indigenous community access to marine resources and the ocean: A policy imperative for Canada. *Marine Policy*, *87*(November 2017), 186–193. https://doi.org/10.1016/j.marpol.2017.10.023

Brinson, A., Lee, M. Y., & Rountree, B. (2011). Direct marketing strategies: The rise of community supported fishery programs. *Marine Policy*, *35*(4), 542–548. https://doi.org/10.1016/j.marpol.2011.01.014

Cabral, R. B., Mayorga, J., Clemence, M., Lynham, J., Koeshendrajana, S., Muawanah, U., Nugroho, D., Anna, Z., Mira, Ghofar, A., Zulbainarni, N., Gaines, S. D., & Costello, C. (2018). Rapid and lasting gains from solving illegal fishing. *Nature Ecology and Evolution*, *2*(4), 650–658. https://doi.org/10.1038/s41559-018-0499-1

Cinner, J. E., Daw, T. M., McClanahan, T. R., Muthiga, N., Abunge, C., Hamed, S., Mwaka, B., Rabearisoa, A., Wamukota, A., Fisher, E., & Jiddawi, N. (2012). Transitions toward co-management: The process of marine resource management devolution in three east African countries. *Global Environmental Change*, *22*(3), 651–658. https://doi.org/10.1016/j.gloenvcha.2012.03.002

Cisneros-Montemayor, A. M., & Sumaila, U. R. (2019). Busting myths that hinder an agreement to end harmful fisheries subsidies. *Marine Policy*, *109*(September). https://doi.org/10.1016/j.marpol.2019.103699

Cohen, P. J., Allison, E. H., Andrew, N. L., Cinner, J., Evans, L. S., Fabinyi, M., Garces, L. R., Hall, S. J., Hicks, C. C., Hughes, T. P., Jentoft, S., Mills, D. J., Masu, R., Mbaru, E. K., & Ratner, B. D. (2019). Securing a just space for small-scale fisheries in the blue economy. *Frontiers in Marine Science*, *6*(MAR), 1–8. https://doi.org/10.3389/fmars.2019.00171

Crenshaw, K. (2017). On Intersectionality: Essential Writings. *Books*. https://scholarship.law.columbia.edu/books/255

Crona, B., & Bodin, Ö. (2010). Power Asymmetries in Small-Scale Fisheries. *Ecology and Society*, *15*(4). http://www.jstor.org/stable/26268218

Devlin, C., Glaser, S. M., Villegas, C., & Poinsatte, N. (n.d.). *Rough seas*.

FAO. (2008). FAO Statistical Areas for Fishery Purposes. http://localhost:8080/fishery/geonetwork/srv/api/records/ac02a460-da52-11dc-9d70-0017f293bd2

FAO. (2018). *The State of World Fisheries and Aquaculture 2018*. http://www.fao.org/documents/card/fr/c/I9540EN/

Food and Agriculture Organisation (FAO). (2015). Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries. In *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication*. http://www.fao.org/docrep/field/003/ab825f/AB825F00.htm#TOC

Fröcklin, S., De La Torre-Castro, M., Lindström, L., & Jiddawi, N. S. (2013). Fish traders as key actors in fisheries: Gender and adaptive management. *Ambio*, *42*(8), 951–962. https://doi.org/10.1007/s13280-013-0451-1

Gagern, A., & van den Bergh, J. (2013). A critical review of fishing agreements with tropical developing countries. *Marine Policy*, *38*, 375–386. https://doi.org/10.1016/j.marpol.2012.06.016

Gelcich, S., Cinner, J., Donlan, C. J., Tapia-Lewin, S., Godoy, N., & Castilla, J. C. (2017). Fishers' perceptions on the Chilean coastal TURF system after two decades: Problems, benefits, and emerging needs. *Bulletin of Marine Science*, *93*(1), 53–67. https://doi.org/10.5343/bms.2015.1082

Gelcich, S., Martínez-Harms, M. J., Tapia-Lewin, S., Vasquez-Lavin, F., & Ruano-Chamorro, C. (2019). Comanagement of small-scale fisheries and ecosystem services. *Conservation Letters*, *12*(2), 1–13. https://doi.org/10.1111/conl.12637

Hanich, Q., Campbell, B., Bailey, M., & Molenaar, E. (2015). Research into fisheries equity and fairness-addressing conservation burden concerns in transboundary fisheries. *Marine Policy*, *51*, 302–304. https://doi.org/10.1016/j.marpol.2014.09.011

Harper, S., Grubb, C., Stiles, M., & Sumaila, U. R. (2017). Contributions by Women to Fisheries Economies: Insights from Five Maritime Countries. *Coastal Management*, *45*(2), 91–106. https://doi.org/10.1080/08920753.2017.1278143

ILO. (2016). Fishers first - Good practices to end labour exploitation at sea. *Fundamental Principles and Rights at Work Branch*.

Jacquet, J. (2009). Silent water: A brief examination of the marine fisheries crisis. *Environment, Development and Sustainability*, *11*(2), 255–263. https://doi.org/10.1007/s10668-007-9108-1

Kaplan-Hallam, M., Bennett, N. J., & Satterfield, T. (2017). Catching sea cucumber fever in coastal communities: Conceptualizing the impacts of shocks versus trends on social-ecological systems. *Global Environmental Change*, *45*(January), 89–98. https://doi.org/10.1016/j.gloenvcha.2017.05.003

Levin, J. (2018). Seafood fraud and mislabelling across Canada. *Oceana*.

Pauly, D., & Zeller, D. (2016). Catch reconstructions reveal that global marine fisheries catches are higher than reported and declining. *Nature Communications*, *7*. https://doi.org/10.1038/ncomms10244

Pinkerton, E. (2019). Legitimacy and Effectiveness through Fisheries Co-Management. *The Future of Ocean Governance and Capacity Development*:333–337.

Sala, E., Mayorga, J., Costello, C., Kroodsma, D., Palomares, M. L. D., Pauly, D., Sumaila, U. R., & Zeller, D. (2018). The economics of fishing the high seas. *Science Advances*, *4*(6), eaat2504. https://doi.org/10.1126/sciadv.aat2504

Schuhbauer, A., Chuenpagdee, R., Cheung, W. W. L., Greer, K., & Sumaila, U. R. (2017). How subsidies affect the economic viability of small-scale fisheries. *Marine Policy*, *82*(March), 114–121. https://doi.org/10.1016/j.marpol.2017.05.013

Selig, E. R., Kleisner, K. M., Ahoobim, O., Arocha, F., Cruz-Trinidad, A., Fujita, R., Hara, M., Katz, L., McConney, P., Ratner, B. D., Saavedra-Díaz, L. M., Schwarz, A. M., Thiao, D., Torell, E., Troëng, S., & Villasante, S. (2017). A typology of fisheries management tools: using experience to catalyse greater success. *Fish and Fisheries*, *18*(3), 543–570. https://doi.org/10.1111/faf.12192

Sumaila, U. R., Zeller, D., Hood, L., Palomares, M. L. D., Li, Y., & Pauly, D. (2020). Illicit trade in marine fish catch and its effects on ecosystems and people worldwide. *Science Advances*, *6*(9), 1–8. https://doi.org/10.1126/sciadv.aaz3801

Tengö, M., Brondizio, E. S., Elmqvist, T., Malmer, P., & Spierenburg, M. (2014). Connecting diverse knowledge systems for enhanced ecosystem governance: The multiple evidence base approach. In *Ambio* (Vol. 43, Issue 5, pp. 579–591). Kluwer Academic Publishers. https://doi.org/10.1007/s13280-014-0501-3

Yodanis, C. L. (2000). Constructing gender and occupational segregation: A study of women and work in fishing communities. *Qualitative Sociology*, *23*(3), 267–290. https://doi.org/10.1023/A:1005515926536

Annex 2.12 Economics, values and indicators

Brief historical perspective

Already for John Locke, 'nature' was considered as responsible for the generation of value in terms of wealth, albeit only a rather small fraction (1/10) in comparison to human labour (Locke, 1960; Gómez-Baggethun et al, 2010). Until about the middle of the 19th Century 'Land' was considered as an essential production factor and basis for the generation of 'value' in terms of wealth together with human labour and man-made capital. With the discovery of fossil fuels and artificial fertilisers, nature became increasingly irrelevant in economic representation of how value is produced, both in the sense of use value (something delivers a specific contribution to well-being/utility due to its particular characteristics, like a coat to keep one warm) and exchange value (measured as its monetary value in markets). Nature basically disappeared from economic considerations until a new awareness about the ecological crisis manifested itself in the 1970. Then nature re-entered economics in terms of natural capital – as an essential basis for the generation of (economic) value, referring to the active role of natural entities and processes as delivering streams of benefits (i.e., 'good') to people (often interpreted as utility in economics; Broome, 2004).

Economists from different schools agree that natural capital is an essential element in the generation of flows of benefits to satisfy human needs. It cannot be entirely replaced by other factors, implying that it has to be part of the general portfolio that the current generation owes to future ones. However, a controversy still exists about to what extent natural capital can be replaced by man-made capital (sustainability debate). While environmental economists argue for a relatively high substitution elasticity (i.e., natural capital can, to a large extent albeit never completely, be replaced by man-made capital), ecological economists claim that natural capital often cannot be substituted for. They refer to the concept of 'critical natural capital' referring to elements in nature that cannot be substituted for to maintain its capacities (Neumayer 1999). Another important difference is the assumption about future values and costs. While the focus in the 1970s was mostly on natural resources and their scarcity, the attention shifted later to the absorption capacity of natural sinks and more in general to all the benefits that nature provides to people and the costs that its loss would generate. The use of the notion of ecosystem services (ES) as discourse was initiated (Daily 1997) and established through the Millennium Ecosystem Assessment (2005). In the ES discourse, the consideration of the economic value of nature for society became broader or more diversified.

Preferences and Indicators

Values as preferences

Value is in mainstream/neoclassical economics expressed in terms of preferences. Although there is not a consensus on the use of the term, preferences refer, in a general sense, to subjective rankings between choice alternatives (Hausman 2012) which imply evaluating and comparing alternatives.

According to neoclassical economics, value is assigned to biodiversity or ecosystem services "to the extent that these fulfil needs or confer satisfaction to humans either directly or indirectly" and is therefore anthropocentric and for the most part instrumental (Kumar, 2011). At the same time, it aims

at representing indirectly some of other – especially intrinsic – values as well, albeit also expressed in terms of preference satisfaction, as in the case of the so-called 'existence value' (see F*igure SM2.18)*.

Throughout the history of economics, value has been understood in various ways. However, from the end of the 19th century onward, the basis for value has been conceived mostly as subjective and rooted in the individual. Something has value when it delivers subjective satisfaction to the individual, regardless of its inherent characteristics or of the social processes and relations that led to its existence and functioning. Accordingly, an individual 'subjective satisfaction is derived from the consumption of prefered bundles of goods and services, which can be aggregated/measured into what is called utility. In mainstream economic models, the maximisation of one's utility drives choices and decisions.[13]

Understanding preferences as ranking of values implies:

- Something is valuable in relative terms to something else. Because individual utility cannot be measured directly, mainstream economists assess it indirectly based on the ranking of alternatives made by individuals, i.e., by assessing the relative importance of something with respect to something else and according to how people manifest or articulate this ranking in their choices. Thus, for mainstream economics, value(s) manifest as preferences through trade-off decisions and thus can be in principle comparable and commensurable.
- The basis for the commensurability is the 'utility' derived from ecosystem services for an individual, measured through a common unit of account: mostly this unit is money. Economics "assumes that ecosystem values are commensurable in monetary terms, among themselves as well as with human-made and financial resources, and that subsequently, monetary measures offer a way of establishing the trade-offs involved in alternative uses of ecosystems" (Kumar, 2011). Willingness to pay for a good at a margin in a given context, provides a measure of the strength of the preference for the good and thus its contribution to the consumer's wellbeing. (O'Neill 2017). "Since in many societies people are already familiar with money as a unit of account, expressing relative preferences in terms of money values may give useful information to policy-makers" (TEEB, 2010a). The assumption is that, given a limited budget and relative prices, people would allocate their money according to their preferences, thus revealing values (what is important) through their behaviour.
- Values as preferences can be demonstrated through preference-based methods of valuation that assess revealed and stated preferences: preferences can be assessed by observing how individuals 'reveal' them through their choices in existing or related markets. 'Stated' preferences are assessed through methods that simulate hypothetical markets and collect individuals' Willingness-to-Pay using surveys, or model individual choices in simulated situations.

[13] Utility has been interpreted within economics in different senses. Some use the concept to refer to a persons' good which may relate to notions such as wellbeing, pleasure, happiness, or lack of pain. Others define utility as the value of a function that represents a person's preferences (Broome, 2004). From this perspective, a utility function assigns a numerical value to consumption bundles in a way that "more-preferred bundles get assigned larger numbers than less-preferred bundles" (Varian, 2014: 55).

Preference-based-approaches are useful to assess the relative importance of states of affairs through choice decisions and money allocation, but they also have limitations.

- Economics' preference-based-approach can -in principle- articulate a type of specific value (intrinsic, instrumental, relational), as long as they can be legitimately translated into the preference language. This requires that values are framed in terms of trade-offs and translated into "quantitative monetized terms and that they are therefore directly comparable" (TEEB, 2010b). However, there are situations in which this translation is problematic, and the preference-based framing or monetary valuation methods are less reliable or unsuitable (ibid.). A key example regards highly complex ecological systems involving multiple ecosystems and services, a context that may imply that multiple values are strongly linked. Other regards cases when a plurality of deeply rooted ethical or cultural values are at stake. In the latter case, people often resist explicitly or implicitly the preference-based language (e.g., Temper and Martinez-Alier 2013). Translating these values into preferences and assessing them via monetary approaches, raises in such cases issues around epistemic and environmental justice.
- Revealed preferences are limited to the actual existence of markets and bear the limitations of market imperfections. Revealed preferences depend on heroic simplifications (Georgescu-Roegen 1971) and assumptions about hypothetical conditions. In general, the limitation of an understanding of values in terms of preferences, implies the commensurability of different types of values and that ranking is always possible. The question is, for example, whether "the religious or bequest value that may be attributed to a forest can be considered within the same framework as the economic value of logging or recreation in that forest" (TEEB, 2010a). A way of addressing these issues is for example to distinguish between felt or immediate preferences (i.e., "desires or needs satisfied by immediate experience"; Norton 1984) and deliberated, considered or reflected preferences that encompass judgments and reasons in assessments (i.e., "an idealization in the sense that it can only be adopted after a person has rationally accepted an entire world view and, further, has succeeded in altering his felt preferences so that they are consonant with that world view" (ibidem)). Workshops, for example, in which individuals discuss and reflect collectively on their preferences, such as in deliberative monetary valuation methods, can overcome some of the problems associated with preference-based methods (Christie et al. 2006). However, mainstream economics typically considers preferences at 'face value' without investigating further about motivation, motives, or reasons and thus mostly aims at identifying felt preferences as they manifest in actual or simulated choices.
- Added to the challenges related to the information problems involved and assuming commensurability, there are also issues regarding the effects of the income distribution on whose values count in willingness-to-pay estimates whether based on contingent valuation method or choice experiments. Moreover, nature is common to us. That implies limitations for a preference-based understanding as 'my preferences impact upon your opportunities' (Vatn 2015). This interdependency points towards what are acceptable preferences to hold in a society. Norm development and socialization is not least about forming a common understanding of shared challenges. It is about communicating about what is 'acceptable behaviour' given that behaviours are interdependent. It lies at the basis of value and norm formation in a society. We observe that many areas in life are devoid

of trade-offs exactly because we talk of principles that are agreed solutions to interdependencies. Notably, deliberative monetary valuation may help overcome the information and common good challenges, but not the others.

Values as indicators

Indicators refer to quantitative or qualitative dimensions that can assess either directly or indirectly the value attributed to something. Indirect indicators can be employed as proxies to identify the salience or relevance of values, for example by assessing them in terms of preferences. Indicators encompass biophysical, socio-cultural, and economic ones.

- **Biophysical indicators** encompass measurements of the stocks and flows of organisms, material and energy in ecosystems, such as the water that flows in a river (m3/s), the area covered by mangroves (ha), the amount of carbon sequestered in an ocean (tons), or the number of bird species in a grassland habitat (species richness). These indicators are appropriate for quantifying some intrinsic values (i.e., the non-anthropocentric components of nature), fundamental-relational values (i.e., life-supporting services), and instrumental values (i.e., direct and indirect use-values and insurance values of material and regulating NCP).
- **Socio-cultural indicators** include quantitative and qualitative indicators. The former includes for example, willingness to give up time for ecosystem services conservation (García-Llorente et al. 2016); measurement of the level of agreement with statements related to values via psychometric surveys (Klain et al. 2017); Q-methodology to represent values and worldviews regarding ecosystem services (Grimsrud et al. 2020). Qualitative indicators may cover ethnographic accounts, themes from texts etc. Participatory approaches – such as art-led dialogue (Edwards et al. 2016) or deliberative methods (Zografos and Howarth, 2010; Ranger et al., 2016) where arguments are important outputs. Valuation methods based on socio-cultural indicators are particularly useful to capture a broad range of values (Jacobs et al. 2018), including, for example, intrinsic value (in the sense of inherent moral value of more than human beings), eudaemonic and constitutive relational values (expressed via sense of place, care, reciprocal responsibilities, personal and collective identity), and instrumental values (as non-use values, especially option or bequest values).
- **Economic indicators** are typically, albeit not exclusively, preference-based and assess subjective preferences through methods such as contingent valuation, choice experiments, or hedonic pricing. They can refer both to benefits derived from healthy ecosystems and to costs caused by their depletion. Economic valuation methods encompass e.g., willingness to pay measures, cf. also the concept of Total Economic Value (TEV). In fields such as ecological economics, indicators based on biophysical measurements also play a central role besides preference-based ones. They measure the physical costs "[...] in terms of labor, surface requirements, energy or material inputs [...] of producing a given good or service" (TEEB, 2010a) or of maintaining a certain ecological state. Methods encompass, for example, material-flow-analysis, Human Appropriation of Net Primary Production (HANPP), or the ecological footprint. Both types of economic indicators can help assess different types of values. TEV is particularly adequate to represent instrumental values in a wider sense, encompassing direct and indirect use values.

Economic indicators can support the assessment of intrinsic values (in the objective, biophysical sense of the term) or fundamental-relational values related to life-supporting services (via biophysical indicators such as HANPP or the assessment of costs associated with loss of ecosystems' functionality). Economic indicators can also serve as proxies to identify preferences related to eudaemonic-relational values (for values that, depending on the socio-cultural context, can be legitimately expressed in terms of preferences, such as recreational, amenity, or some aesthetic values).

- **Health** indicators are often considered in the literature as a separate category, but essentially utilize the other three sets of indicators. For example, biophysical measures of the human body are used to determine exposure to contamination (e.g., ppm of lead) or disease organisms (e.g., virus load/mL of blood). In part, health is also the product of the ecosystem of associated microorganisms that live on and in the human body (e.g., microbiome, organosphere Armiero & De Angelis 2017).

The economics of ecosystems and biodiversity (TEEB)

Through TEEB (2010) a first systematic and comprehensive synthesis of the economic value of ecosystem services and biodiversity was produced for policy makers. The great contribution of TEEB was to demonstrate both the economic cost of biodiversity loss and ecosystem damage and the economic benefits of healthy ecosystems and to produce concrete advice for policy makers not only with respect to assessing values, but also as guidance for policy measures such as incentives, regulations, and efficient resources management.

- TEEB offers a tool for policy makers to assess the diverse values of biodiversity and ecosystem services in a comprehensive and at the same time practically applicable way. On the one hand, it offers a wide understanding of the values of biodiversity and ecosystem services via a three-steps-approach: (a) recognizing values (where strong socio-cultural values attributed to nature are strong and deeply rooted in communities or a long tradition in conservation is present); (b) demonstrating values (via diversified economic valuation methods, where trade-offs or the implications of different management options can adequately be expressed in monetary terms); (c) capturing values (through policy instruments that incorporate the value of ecosystem services into decision making via incentives or regulations). It describes the various tools for a better account of the monetary value of ecosystem services and biodiversity, thus drawing the attention of policy makers and business to the economic value of nature, while at the same time limiting the scope of monetary valuation.
- Cost-Benefit-Analysis (CBA) dominates economic-led decision making and can be useful to support conservation policies when applied carefully and within their scope. TEEB details the scope and conditions under which CBA is a robust assessment tool, but identifies also its limitations, including situations of high uncertainty, irreversibility of environmental change, problematic distribution across winners and losers, and long-term time scale of impact that cannot be legitimately discounted. A useful tool of policy makers is also Cost-Effectiveness-Analysis (CEA) that evaluates costs of reaching politically defined goals when different options or implementations paths are possible. In the case of CEA, the justification for political decisions is not based on economic argument and might encompass other types of value justification (e.g., moral obligations towards future

generations or towards other species, recognition of values that are constitutive for people's identity, etc.), but the implementation path (i.e., which alternative should be chosen to achieve the policy goal) is subject to economic assessment for a better management of all available resources. Other methods include participatory approaches, in which typically stakeholders, led by a facilitator, discuss relevant opportunities and dilemmas (TEEB 2010b).

- By summarizing the state-of-the-art in economics, TEEB proposes two key tools to assess the value of ecosystem services and biodiversity: (a) insurance value that refers to the ecosystem's capacity to maintain a sustained flow of benefits and (b) the Total Economic Value (TEV) that encompasses "the aggregated value of the ecosystem service benefits provided in a given state" or output value (TEEB, 2010).
- Total economic value (TEV) is a concept created to encompass a wider range of values associated with benefits or detriments of the environment. Such vares are considered from an economic point of view and expresses how people manifest their preferences with respect to the utility delivered by environmental goods in terms of economic decisions in real markets, or in hypothetical ones where people are asked to state their preferences – cf. *Figure SM2.18*. It also contributes to the diversification of the realm of instrumental values of biodiversity and ecosystem services. The range of value of the TEV includes both stated and revealed preferences. TEV distinguishes among use values, based on the satisfaction generated by direct use (consumptive or non-consumptive) of natural resources or by indirect use (the conditions that enable use and satisfaction), non-use values, and option value (generated by future use). Non-use values refer to the utility or satisfaction generated for an individual by knowing that others will have access to nature's benefits, be it other people currently living (altruist value) or future generations (bequest value), or by knowing that something exists, even if there is no direct access to or direct enjoyment of it (existence value). In environmental economics language, the term altruism refers to individual preferences (i.e., individual satisfaction gained by knowing that other people might enjoy nature's benefits or that other than human beings exist).

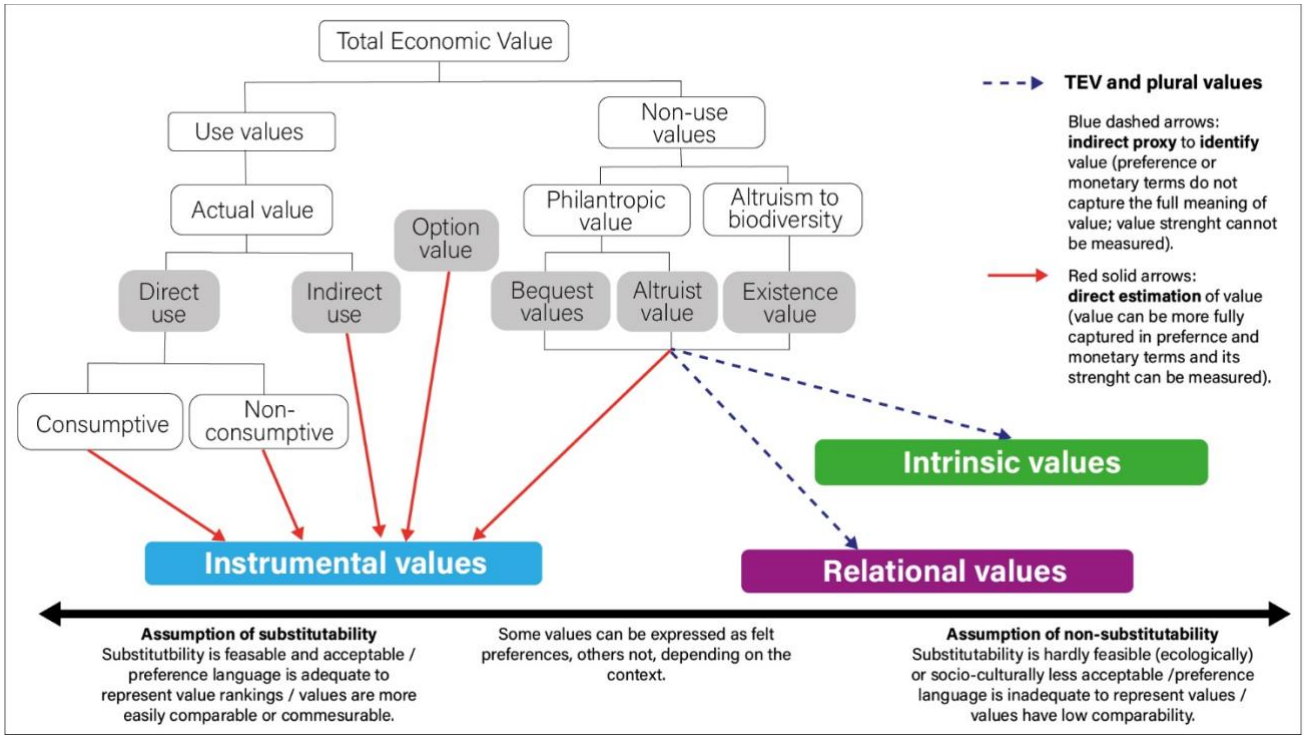

Figure SM2.18 The Total Economic Value (TEV) classification framework. The framework encompasses multiple environmental value types, including a spectrum between stronger and weaker assumptions of substitutability between the objects of value. The red arrows refer to values that can be estimated directly by applying TEV categories. The blue dashed lines refer to a possible, indirect use of TEV categories as proxies to identify values whose full meaning and strength cannot normally be assessed by preference-based or monetary approaches. In such cases, TEV can be replaced or complemented by other frameworks.

- **Values and valuation:** To assess these types of values different methods of valuation have been developed, such as direct market valuation approaches, revealed preference approaches (for example hedonic pricing or travel cost method) and stated preferences approaches (such as contingent valuation or choice modelling) (*Chapter 3*).
- **Scope and strengths of TEV:**
    - TEV is based on a broad understanding of values that goes beyond sheer monetization (Hansjürgens 2014). Direct monetary instruments are most appropriate to capture goods and services for which a market already exists and for revealed preferences. They are most robust when assessing provisioning services and instrumental values such as consumptive values.
    - TEEB and the TEV highlight the importance of a diversified range of instrumental values that have been rather neglected in the traditional conservation literature and stresses the dependence of society and economic development on ecosystems. TEV is helpful in assessing a diverse range of instrumental values, i.e., values that are assumed to be commensurable with others, are in principle substitutable, can be ranked in terms of preferences, and can be expressed in terms of means to an end. By expanding the perspective to future generations, future use, and others' preferences, TEV remains anthropocentric, but can dialogue with weak/wide/enlightened anthropocentrism and, to a certain extent, help building bridges in practice with biocentric or ecocentric solutions, albeit using a language rooted in individual

satisfaction. When applied according to the criteria that TEEB articulates (TEEB, 2010b), it can provide policy makers with a helpful instrument to find agreement/points of convergence across different stakeholders groups.

- TEV can also indirectly assess other types of values, by framing them in the language of preferences as far as this is legitimate. For example, some relational values referring to nature as a source for recreation, beauty, or psychic health can be captured by TEV. Intrinsic values and other relational values can only be represented indirectly via proxies that articulate them in terms of individual preferences satisfaction, as in the case of the existence value (satisfaction derived by knowing that something exists), albeit demonstrating them in terms of utility and individual, subjective satisfaction.

- **Limitations of TEV:**
  - TEV cannot capture the value of the biotic and abiotic prerequisites for the functional reliability and the self-organization of the ecological systems (primary values) because these types of value "are not ascertainable via individual preferences of human beings and therefore they cannot be assessed monetarily on the basis of certain economic methods of evaluation" (Hansjürgens, 2014, p. 79). Other indicators than economic ones should be used instead (biophysical or ecological-economic indicators, see above).
  - Because TEV frames values in terms of individual preference satisfaction and utility, it can be used as a solid and appropriate model whenever this framing is adequate to the situation at stake. There is nothing inherent in spiritual values, for example, that hinders that they are framed in terms of direct, non-consumptive use-values or as individual preferences according to TEV. However, this representation implies that they can be ranked, traded and commensurate with other values. For example, existence value does not represent the meaning associated with intrinsic values because existence value does not refer to the value of nature for its own sake, but to the satisfaction of knowing that it will continue to exist (Attfield, 1998). In environmental conflict situations, in which for example spiritual values are at stake, people implicitly or explicitly reject the reduction of spiritual values to preferences and refuse to negotiate about trade-offs or compensations for their loss. This is also often the case for other relational values associated with sense of place, identity, care, and responsibility, although exceptions are possible. In these cases, using the TEV framework would not only bear on consequences in terms of environmental and epistemic justice, but also fail to represent the actual complexity of environmental conflicts – which are in many cases value conflicts (Martinez-Alier 2002), thus leading to inadequate policies to address them. As acknowledged by TEEB, non-use values present "greater challenges for valuation than do use values since non-use values are related to moral, religious or aesthetic properties, for which markets usually do not exist." (TEEB, 2010a).
  - Focusing on individual preferences underestimates social/intersubjective? interactions in valuation and might infringe upon other frameworks of decision making, such as cooperative consensus building or collective decision making (Gowdy & Erickson 2005; TEEB, 2010a).

To sum up, as TEEB clearly articulates, monetary indicators and valuation methods get less useful for policy and less robust for research the more complex the social and ecological systems at stake

are and the deeper and more heterogeneous the values and beliefs associated to nature are (*Figure SM2.18*, O'Connor and Frame 2008; Kumar, 2011). While on the one hand TEV can capture a wide range of values, it gets less robust as a tool to support policy decisions when applied to non-instrumental values. As explained above, other value types can be captured under TEV only insofar as they can be framed in terms of individual preference satisfaction and utility. *Figure SM2.18* summarizes the scope of TEV on a spectrum that highlights when it can be used as a robust basis to assess the way in which people value ecosystem services and biodiversity, when it has to be complemented by other methods to be useful for policy decisions and when assessments should be based on entirely different methods.

References

Armiero, M., & De Angelis, M. (2017). Anthropocene: Victims, Narrators, and Revolutionaries. *South Atlantic Quarterly* 1, 116 (2): 345–362. doi: https://doi.org/10.1215/00382876-3829445

Broome, J. (2004). Utility, in Broome, J. Ethics out of Economics. Cambridge University Press: Cambridge.

Christie, M., Hanley, N., Warren, J., Murphy, K., Wright, R., & Hyde, T. (2006). Valuing the diversity of biodiversity. Ecological Economics, 58(2), 304–317. https://doi.org/10.1016/j.ecolecon.2005.07.034

Daily, G. C. (1997). *Nature's Services. Societal Dependence on Natural Ecosystems.* Island Press.

Edwards, D. M., Collins, T. M., & Goto, R. (2016). An arts-led dialogue to elicit shared, plural and cultural values of ecosystems. Ecosystem Services. https://doi.org/10.1016/j.ecoser.2016.09.018

García-Llorente, M., Castro, A. J., Quintas-Soriano, C., López, I., Castro, H., Montes, C., & Martín-López, B. (2016). The value of time in biological conservation and supplied ecosystem services: A willingness to give up time exercise. Journal of Arid Environments, 124, 13–21. https://doi.org/10.1016/J.JARIDENV.2015.07.004

Georgescu-Roegen, N., & Georgescu-Roegen, N. (1971). The Entropy Law and the Economic Process.

Gómez-Baggethun, E., de Groot, R., Lomas, P. L., & Montes, C. (2010). The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes. Ecological Economics, 69(6), 1209–1218. doi:10.1016/j.ecolecon.2009.11.007

Grimsrud, K., M. Graesse and H. Lindhjem, (2020). Using the generalised Q method in ecological economics: A better way to capture representative values and perspectives in ecosystem service management. Ecological Economics, 170, 106588.

Hausman, J. (2012). Contingent Valuation: From Dubious to Hopeless. Journal of Economic Perspectives, 26(4), 43–56. https://doi.org/10.1257/jep.26.4.43

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. https://doi.org/10.1016/j.ecoser.2017.07.011

Klain, S. C., Olmsted, P., Chan, K. M. A., & Satterfield, T. (2017). Relational values resonate broadly and differently than intrinsic or instrumental values, or the New Ecological Paradigm. PLoS ONE, 12(8). Scopus. https://doi.org/10.1371/journal.pone.0183962

Kumar, P. (Ed.). (2011). The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations. Routledge. https://www.routledge.com/The-Economics-of-Ecosystems-and-Biodiversity-Ecological-and-Economic-Foundations/Kumar/p/book/9780415501088

Locke, John. (1960). Two Treatises of Government, Peter Laslett (ed.), Cambridge: Cambridge University Press, 1960

Neumayer, E. (1999). *Exploring the Limits of Two Opposing Paradigms*. Edward Elgar Publishing Limited.

O'Neill, J. (2017). The price of an apology: Justice, compensation and rectification. Cambridge Journal of Economics, 41, 1043–1059. https://doi.org/10.1093/cje/bew047

Ranger, S., Kenter, J. O., Bryce, R., Cumming, G., Dapling, T., Lawes, E., & Richardson, P. B. (2016). Forming shared values in conservation management: An interpretive-deliberative-democratic approach to including community voices. *Ecosystem Services*, *21*, 344-357. https://doi.org/10.1016/j.ecoser.2016.09.016

TEEB. (2010a). Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of TEEB. UNEP.

TEEB. (2010b). TEEB for Local and Regional Policy Makers.

Varian, H. (2014). Intermediate Microeconomics with calculus. W. W. Norton & Company: New York

Zografos, C., & Howarth, R. B. (2010). Deliberative Ecological Economics for Sustainability Governance. *Sustainability*, *2*(11), 3399-3417. https://doi.org/10.3390/su2113399

Annex 2.13 The life framework of nature's values

Introduction

This annex provides a supplement to the *IPBES values assessment*, *Chapter 2*. *Chapter 2* demonstrates many types and aspects of values, and value related concepts. While there are many frameworks that characterise or organize values in some way, based on an extensive review of such frameworks and approaches, *Chapter 2* concluded that there is a clear knowledge gap for an organizing framework that cut across multiple disciplines, knowledge paradigms and understandings of values and human-nature relations. The life framework is a way to organize values of nature in relation to four basic ways of human-nature relating: *living from*, *living in*, *living with* and *living as nature*. Nature can here be seen in a global sense or in specific forms (e.g., a woodland or river catchment). Semantic variations of the frames in different UN languages are exemplified in *Table SM2.8*.

Table SM2.8 Examples and semantic variations of the life frames in the six official UN languages.

	Living from nature	Living with nature	Living in nature	Living as nature
Arabic	العيش من	العيش مع	العيش في	العيش مثل
Chinese	以自然资源为生	与自然共生 (洪水，地震危险，需要保护的物种)	生活在自然里 (领土，森林景观)	生活犹如自然 (像一座山一样思考)
French	*Vivre de la mer*	*Vivre avec*	*Vivre dans la forêt*	*Penser comme une montagne*
Russian	Жить за счет	Жить с	Жить в	Жить как
Spanish	*Viviendo del mar*	*Viviendo con inundaciones*	*Viviendo en un paisaje forestal*	*Pensando como una montaña*
English	Living from the sea	Living with floods	Living in a forest landscape	Thinking like a mountain

The framework was coined by O'Connor and Kenter (2019) building on original work by O'Neill et al. (2008) and further elaborated by Kenter and O'Connor (2022), particularly regarding the addition of the *living as nature* frame and the different ontological perspectives associated with the frames. The framework has been further developed by the IPBES values assessment based on systematic review[14], policy documents[15] and indigenous and local knowledge sources[16] to consider how the frames are implied and applied, to consider whether the four frames are comprehensive or whether there are other frames used in these knowledge sources, to test the ability of the framework to coherently and comprehensively organize values, and to understand in depth how different life frames associate with different types of broad and specific values and NCP. This annex provides further detail on how the four life frames are being elaborated based on these sources.

There are three key reasons why, specifically, the life framework has been utilised within the *values assessment* as an overarching way to frame values:

- There is a need to unpack NCP with regard to human-nature relationships. While NCP seeks to expand the scope of epistemic and environmental worldviews and human-nature relations relative to ecosystem services approaches (Diaz et al. 2018), the gradient of these worldviews has not been unpacked, as has the notion of 'context-specific' NCP. A

[14] Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).
[15] Analysis of national and international policy documents related to biodiversity and sustainability (https://doi.org/10.5281/zenodo.4399907).
[16] Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

practical organizational framework is needed to support consideration of a broad range of values and that connects these values with diverse interpretations of nature, good quality of life and sustainability.

- There is also a need to expand consideration of values and worldviews beyond those that are less well captured by NCP. The notion of NCP is anthropocentric, and thus does not include non-anthropocentric worldviews and values. Whilst reciprocal relations are recognised as important by the NCP framework, there remains a tension with the terminology that emphasizes a one directional flow of benefits from nature to people, not directly acknowledging people's contributions to nature. The life framework (particularly through the *living with* and *as nature* frames) provides an overarching conceptual framing and terminology that more explicitly acknowledges intrinsic, reciprocal and embodied values (for examples, see *Table SM2.9*), and non-dualistic worldviews, and provides a vehicle for more effective recognition of these values and worldviews in policy.
- The many traditions of values use diverse, often abstract, and challenging concepts and taxonomies of values that can be difficult to communicate to policy makers, stakeholders and citizens. There is a risk that policy makers and practitioners cannot see the wood for the trees, which may lead to privileging of familiar values in decisions. The life frames provide an inclusive yet intuitive and straightforward heuristic and organizational structure that connects many different broad and specific values yet can reduce complexity.

As such, the life framework can be seen as a means to support the operationalisation of the Ecosystem Approach, which included principles around the need to include all relevant scientific, local and indigenous knowledges perspectives (Principle 11) as well as balance use and conservation (Principle 10), and intrinsic values and tangible and intangible benefits to people (Principle 1). The life framework can also directly support the Sustainable Development Goals, again relating to balancing use and conservation of biodiversity (SDG 14.2, 15.1, 15.5, 15.6) and integration of values of nature into decisions (SDG 15.9). Crucially, the recognition that many people will be able to harbour or at least acknowledge multiple frames can provide a basis for building a degree of common understanding across different interests that can form the basis for dialogue and, potentially, formation of shared values around policy solutions (Irvine *et al.*, 2016). The framework can also help better engage with knowledge traditions that have remained shy of benefits-based conceptions of nature, and thus draw and acknowledge methodologies thus far less common to ecosystem services research, such as historical and archaeological methods, ethnographic observation or arts-based research (*e.g.*, Brear *et al.*, 2019; Edwards *et al.*, 2016).

Section 2 of this annex will briefly outline the assessment methodology.

Section 3 will review each of the life frames, the conceptualisations they offer, and the broad and specific values in relation to nature and NCP they are associated with, including associations with Total Economic Value. We will also consider examples of the salience of indigenous and local people's knowledge for each frame. This section will demonstrate the way in which the life frames can both clarify and mediate the relationship between people and the natural world, pulling together multiple existing valuation concepts whilst highlighting ways in which decision-making contexts can be more inclusive of multiple values.

Section 4 will consider the concerns and risks associated with over- or underemphasizing the different life frames in policy. The analysis will also highlight how the life framework can be harnessed and communicated as a risk-based tool in order to help incorporate negative values of nature and ecosystem disservices that arise from human-nature relationships.

Section 5 will discuss the positioning of the life frames in relation to the IPBES general framework and the Nature Futures Framework.

Section 6 will discuss the relationship between the life framework and the Nature Futures Framework developed by members of the IPBES scenarios and models expert group (IPBES, 2016).

Table SM2.9 Examples of values and valuations associated with different life frames, in relation to different foci of value according to the IPBES general framework. Italic examples are more obviously Nature's Contributions to People, whereas other examples are less obviously so.

	Life frame			
Foci of values	***Living from***	***Living with***	***Living in***	***Living as***
Nature (Biodiversity and ecosystems, Mother Earth, Systems of Life)	*Maintenance of options*	Modelling the cost-effectiveness of different spatial configurations of marine protected areas for protecting marine biodiversity	Qualitative social research to investigate community understandings of ecological history	Interspecies ethnography to understand and support adaptation strategies
Good quality of life (Human well-being, *Living in* harmony with nature, Living well in balance and harmony with Mother Earth)	Understanding the two-way relations between people and ecosystems in terms of livelihood vulnerability and security	Psychological assessment of feelings of responsibility towards non-human species	Participation rates in beach litter cleans	Observance of reciprocal gift-giving to a sacred river
Regulating aspects and contributions	*Ecological assessments and replacement cost analyses of pollinators*	*Using environmental modelling coupled with cost-benefit analysis to assess flood regulation, to inform planning policy on whether or not a nature based or engineered solution is more efficient*	*Literature analysis to understand the role of pollinators in stories and myths*	Climate modelling to articulate the importance of protecting mother earth as a self-regulating organism, informing global dialogue on serving the needs and interests of the web of life
Material aspects and contributions	*Participatory rural appraisal of local knowledge on the dynamics of agro-forest ecosystems, to inform community action on sustainable agroforest management*	Photo and video elicitation techniques to explore non-human values for materials (*e.g.*, predator and prey relationships)	*Mapping of landscape features in terms of their contribution to cultural heritage*	Documenting the person *as* the biosphere: hundreds of species inseparably compose and sustain our bodies and spirit (material and non-material may or may not be seen as separate)
Non-material aspects and contributions	*Articulating the importance of learning about biodiversity to ensure meeting needs of future generations*	Ethnography of sacred groves/places and their biodiversity	*Using arts-led dialogue to value the importance of species, habitats and ecological processes for community*	

			identity, to inform forest management	

Methodology

The purpose of our review was both to understand quantitative and statistical relations between frames and values, and to develop an in-depth narrative synthesis of how the frames arose in the literature. For the former, we draw on a systematic review of the interdisciplinary peer-reviewed environmental values review and editorial articles within the peer reviewed literature[17]. For the latter, this was supplemented by the policy and indigenous and local knowledge reviews mentioned above drawn on for qualitative analysis.

We searched the Scopus database for articles between January 1, 2005 and May 16, 2019 using the search strings valu* (i.e., value, values, valuation etc.), wellbeing, or quality of life, combined with nature, ecosystem*, biodiversity or landscape, and additionally for environmental valu*, human-nature relat* or society-nature relat*. The time period was chosen to coincide with the year of publication of the Millennium Ecosystem Assessment. Because these searches gave over 100,000 results, the search was restricted to review papers and editorials, providing 7204 results (sample A).

All results were screened by two researchers (HC and JR) on the basis of title and source; if one of the researchers included an article, this was included in the sample for full text screening; this provided 681 English language results and 16 results in other languages (Sample B). Thus, a total of 697 sources were considered for full text review. From these, 98 English language full texts could not be acquired, and 127 English sources were excluded from quantitative analysis following full-text review because they fell outside of the scope of the IPBES values assessment or because they were not review articles or editorials. In the latter case, they could still be drawn on qualitatively. This left a final English language sample of 493 English language articles that were coded using 55 codes relating to the scope of *Chapter 2*[18], including codes for the four life frames. The first 50 articles were coded by both researchers and assessed for intercoder reliability using the Kappa coefficient, returning 0.61, indicating substantial agreement. Following discussion by the coders, the pilot sample was recoded and again analysed for reliability, returning a Kappa of 0.94, which suggests near complete agreement. The remainder of the papers were then coded by one of the two researchers. From the additional 16 non-English language sources (German, French, Italian, Dutch, Spanish or Hungarian), four articles were excluded because a full text could not be located, and one Hungarian article was excluded due to a lack of language capacity within the assessment team. Five articles were excluded from quantitative analysis because they were out of scope of the assessment or not a review or editorial, leaving six remaining non-English sources. These were coded by individuals within the *Chapter 2* author team fluent in these languages, leaving a final total sample of 499 sources for quantitative analysis.

To shed light on the association between certain codes identified in the literature, two approaches were used. The first was hierarchical cluster analysis. SPSS 27 was used to assess clusters between variables, using Ward's linkage method based on Euclidian distances.

A second approach involved estimating coefficients of association: Phi and Yule's Q coefficients were generated using SPSS 27. The Yule's Q coefficient is a derivation of Kruskal's Gamma, indicating the strength of relationship between dichotomous variables (Lewis-Beck et al. 2004). The Phi coefficient is a chi-square-based measure of association used to test the strength of the

[17] Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).
[18] *Idem*

relationship between two binary variables and is equivalent to the Pearson correlation coefficient (Bernard, 2000). Only associations that were statistically significant at $p<0.05$ were considered.

For Yule's Q coefficients, +1 and -1 indicate perfect correlation between variables and 0 indicates no correlation between variables. Q values between 0 and 0.29 indicate a negligible or very small correlation, between -0.30 to -0.49 or 0.30 to 0.49 indicate a moderate correlation between the variables, between 0.50 and 0.69 or -0.50 and -0.69 indicate a substantial correlation between the variables and those between 0.70, or < -0.70 indicate a very strong correlation (Weisberg, 1974).

For Phi (Φ) coefficients, -1 indicates a perfect negative correlation, +1 indicates a perfect positive correlation, and 0 indicates no correlation between variables (Bernard, 2000). Phi values larger than between 0.10 and 0.29 indicate a weak correlation, values between 0.30 and 0.49 indicate a moderate correlation, and those greater than 0.50 indicate strong correlation (Wiedmaier, 2018). Negative values indicate a negative correlation for the same thresholds. It is worth noting that Phi coefficients are likely to be more conservative than Yule's Q coefficients – for example, a Yule's Q value of 0.8 would roughly equate with a Phi value of 0.5 (Weisberg, 1974: 1648).

The quantitative analyses were used to identify associations; these were then further investigated and illustrated qualitatively. Finally, each of the four subsamples coded for each life frame were screened for examples of concerns, negative understandings of the frames, and negative implications or risks, with a focus on policy. In these qualitative analyses, where appropriate further sources were drawn in from the reference lists of the systematic review sources where relevant, from indigenous and local people's knowledge sources compiled for the Assessment[19] and policy document review[20], as well as expert knowledge.

The life frames in the environmental values literature

Results demonstrated that the life frames can be effectively used to organize the environmental values literature. The cluster analysis revealed that systematic review codes associated with a wide range of aspects of values clustered around the four frames. *Figure SM2.19* illustrates a hierarchy between the frames and codes. This image reflects clustering around the degree to which references to each of the concepts, including the life frames and diverse value related concepts considered by *Chapter 2*, were referenced in the literature. For example, sources that referred to norms, rules, or rights (key institutional aspects considered in *Chapter 2*), were most closely clustered with sources that refer to the living from nature frame, whereas sources referring to recognition justice were most closely clustered to the living with nature frame. Because the coding considered reference to the codes, any associations in terms of clusters and correlations needs to be qualitatively interpreted, because a reference could refer to either the application or critique of a particular concept, and also because clustering results can be influenced by the large differences in the proportions of references for each frame in the literature (*Figure SM2.20*).

While each frame is associated with a different sub-cluster, *living in* and *with* are most closely allied in the literature, and then cluster with *living as*, whereas *living from* is least associated with the other frames. At the same time, *living from* was the frame most referred to (*Figure SM2.20*). *Table SM2.10* presents correlations between life frames and references to specific value types in the sample used for the Systematic review on the conceptualizations of values[21]. The remainder of this section presents key associations with each life frame, making reference to further quantitative results and qualitative interpretations.

[19] Analysis of national and international policy documents related to biodiversity and sustainability (https://doi.org/10.5281/zenodo.4399907).
[20] Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).
[21] Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).

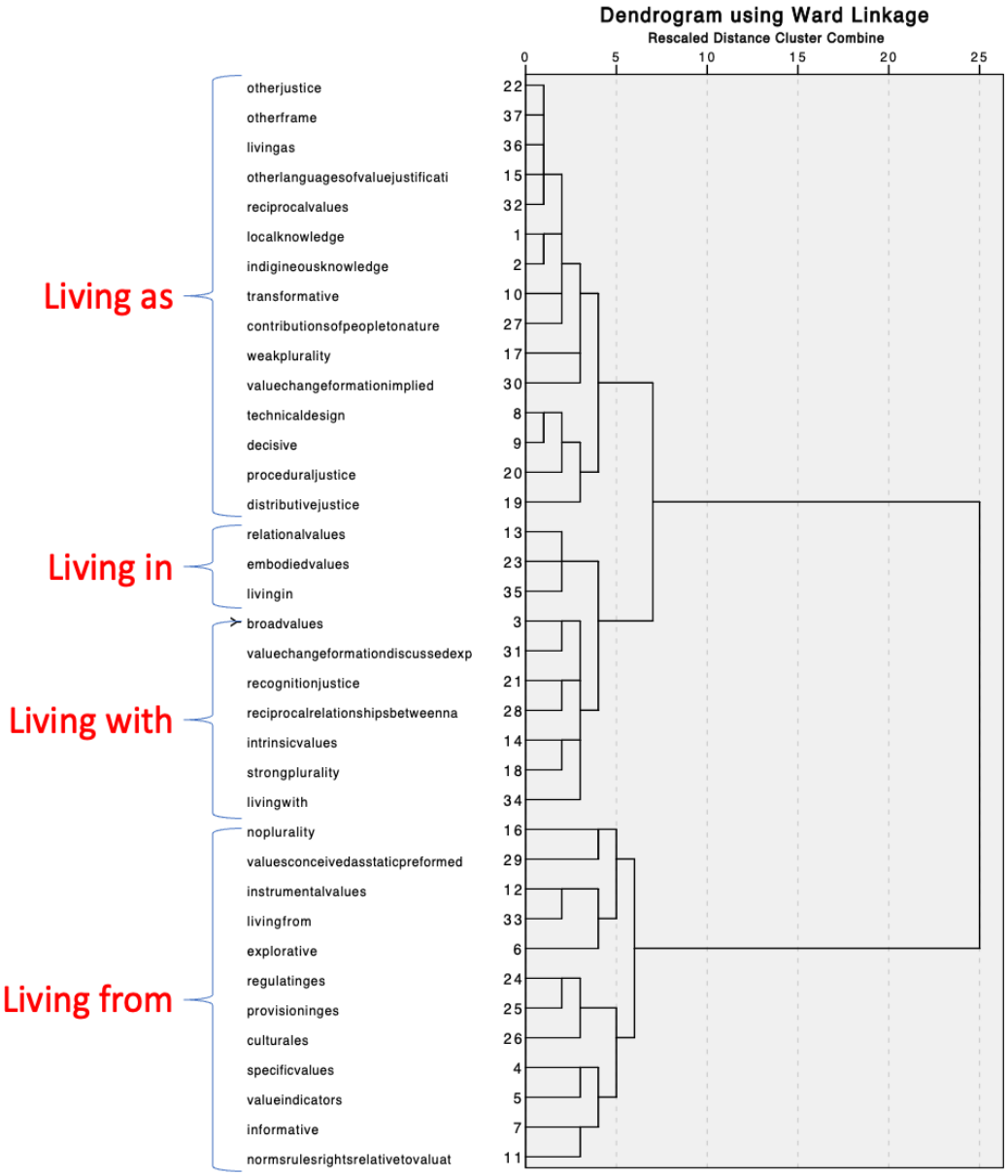

Figure SM2.19 Dendrogram displaying results of cluster analysis and relationships between life frames and key value concepts in terms of reference to these concepts in the systematic review on the conceptualizations of value final sample (n=499). The image highlights the first order clustering in two clusters, between the living from and the other frames. The second order clustering links living and with nature, and third order clustering presents individual clusters for each of the frames.

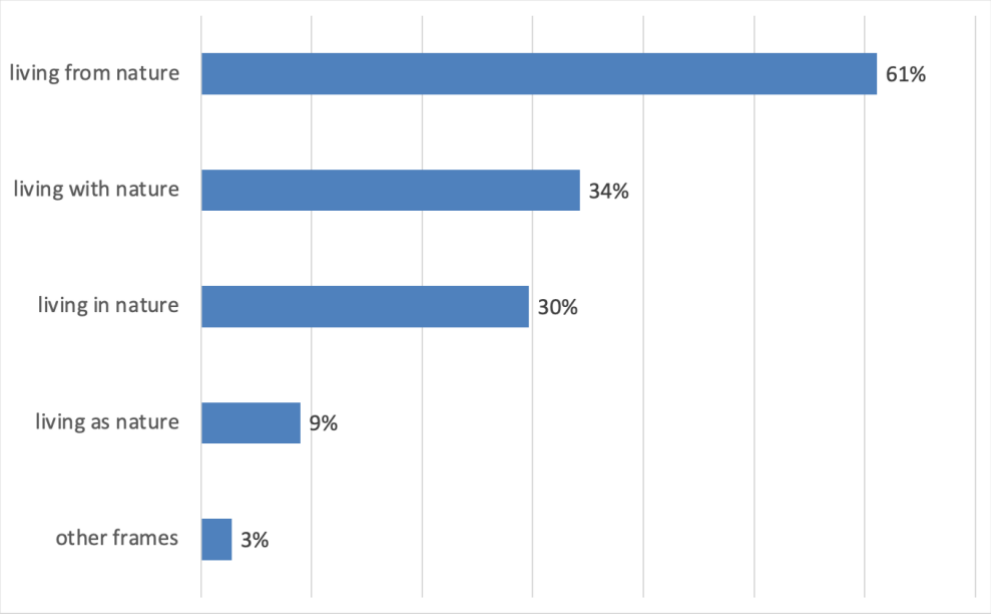

Figure SM2.20 Proportion of papers coded for the life frames in the systematic review sample (n=499)

Table SM2.10 Correlations (φ and Q) between papers coded for life frames and specific value types within the systematic review sample (n=499). Blank cells indicate no significant correlation.

	Intrinsic value		**Instrumental value**		**Relational value**	
	Q	*φ*	*Q*	*φ*	*Q*	*φ*
Living from			0.86	0.53		
Living with	0.62	0.31			0.44	0.22
Living in	0.33	0.14			0.81	0.48
Living as	0.73	0.28	-0.56	-0.19	0.73	0.26

Living from

General perspective and association with worldviews

The framing of '*living from*' encompasses the various ways that humans benefit from and are supported by the natural world. The *living from* frame characterised 61%, the largest proportion, of the literature analysed. Generally, this framing refers to the way in which the natural world is integral to the existence and survival of humans which may explain the dominance of this framing over the other life frames. In this way the *living from* frame reflects some of the key concepts and associated frameworks that have been used to value the environment. For example, the results of the cluster analysis highlighted 'Ecosystem Services' as one of the most closely associated terms with the *living from* frame, which may point to the directional views about flows of benefits and value that laid the foundations for ES as a conceptual framework (Costanza et al., 2017; Diaz et al. 2018; Cooper et al. 2016; James, 2016; Kenter, 2018). Gomez-Baggethun et al., (2010) highlight the economic history building up to ES reflecting a transition from use values to exchange values with the underlying motivation being how to make the most out of *living from* the environment. Similarly '*institutions'*,

another code that was associated with the *living from* frame in the cluster analysis, picked up on this framing as a way of communicating the value of the natural world to humans, conveying how we live from it, as an attempt to ensure its protection across the planet (Daily et al., 2009). This relates to other codes from the cluster analysis, that of the '*explorative and informative purposes of valuation'* (see *Chapter 4* for definitions of different purposes of valuation) where those who proposed value concepts such as ES early on advocating the approach for the very reason that it would be a tool to inform tangible ways in which the environment matters to humans. This can be related to Mace's (2014) notion of the 'Nature *for* people' paradigm of conservation that took off after the Millennium Ecosystem Assessment (MEA, 2005) where the environment is considered in terms of one-directional flow of benefits to humans also highlights this dualistic ontological framing, or worldview, of how human-nature relationships were conceived to be important (*Figure SM2.21*). While ES has substantially diversified since in its attempts to capture a wider range of human-nature relationships (Braat, 2018), the more dualistic epistemic worldview can point to the dominance associated with the *living from* frame in the literature. Associated with this, the *living from* framing is mostly associated with an *anthropocentric* view of the value of the natural world, where moral concern is restricted to humans and their direct interests alone. Some authors closely associate the living from frame with this 'the story of separation' that arises from historical western religious doctrine and philosophy, which allows nature to be "mastered and consumed, a commodity to be exploited" (Riedy et al. 2020:103), which in turn provides a foundation for neoliberal economic thinking, and which stands in the way of a more 'life centered' economics grounded in less dualistic conceptions of human-nature relations (Waddock, 2020), seen as a requirement for more effective sustainability discourses. This is echoed in the thinking associated with Buen Vivir, Ubuntu (Ramose, 1999; Waddock, 2016) and transmodernism (Ateljevic, 2013). These perspectives, also echoed in large-scale recent efforts of interdisciplinary climate science (Ripple et al. 2019; a declaration signed by over 13,000 scientists), in a sense argue for an infusion of the more ecocentric and pluricentric worldviews associated with *living with* and especially *living as* to transform *living from* frames into a more embedded perspective that does not see resources use in isolation from broader relationships, fundamental and intrinsic values, as an essential condition for sustainability transformation.

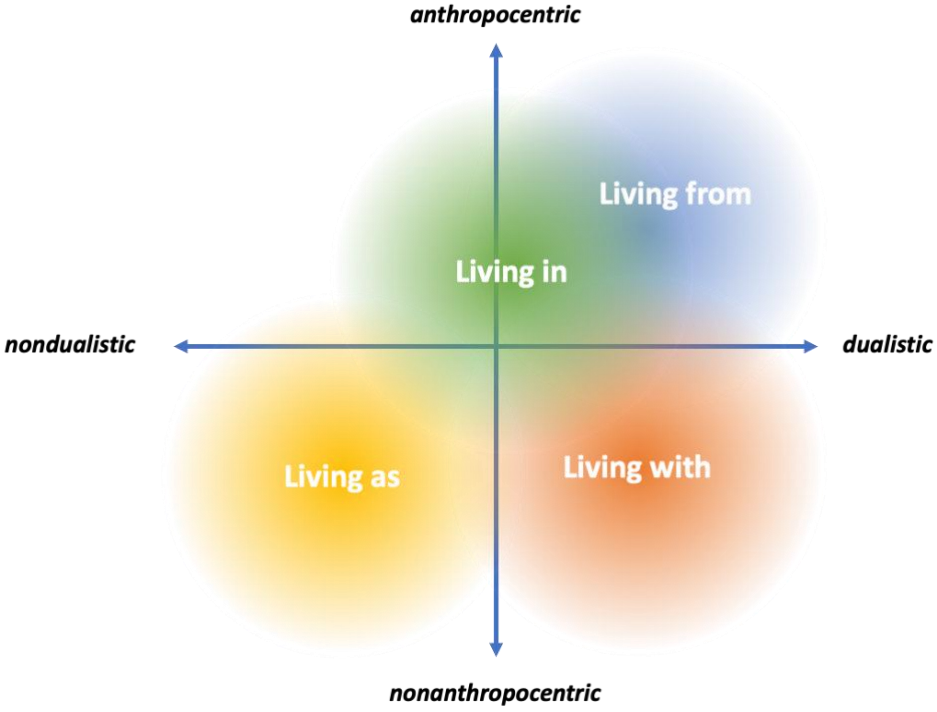

Figure SM2.21 Associations between life frames and worldviews (Source: Kenter & O'Connor, 2022)

Living from and broad and specific values

In terms of broad values, *living from* is most clearly associated with prosperity and livelihood security. Sustainability is important in terms of the original Brundtland definition of balancing future and present needs (WCED, 1987). Sustainability aligned values from the perspective of this frame are thus reflected in the transition between *living from* as a focus on economic production to *living from* as sustainable human wellbeing (Kornatowska and Sienkiewicz, 2018; Ushedo and Ehiri, 2006), or elsewhere in justifications for weak anthropocentrism (Burchett, 2014) and stewardship of ecosystem services and natural capital (Hails and Ormerod, 2013). Justice is particularly important in terms of distributive justice, though recognition justice is also important in terms of whose rights to resources are validated (Martinez-Alier, 2003). Many environmental conflicts can be seen as environmental justice conflicts within the *living from* frame (Martinez-Alier, 2003).

In terms of specific values, the *living from* frame is strongly associated with instrumental values ($Q = 0.86$, $\Phi = 0.53$), owing to the way in which instrumental values view the natural world as important, primarily as a means to an end. Fundamental values are also important as a way of recognising nature as means of supporting our continued subsistence and prosperity. Many of the papers coded as *living from* were concerned with the economic benefits humans receive from nature and the ways in which these benefits might be quantified, for example, papers that advocated placing a monetary value on ecosystem services (Boyd et al., 2016; Brown et al., 2007; Costanza et al., 2017; Dupras et al., 2015) were coded as *living from* and 'instrumental value' since this implies that the service is substitutable and subject to trade-offs; a clear indicator that nature is being valued for the sake of its benefits to humanity. Dempsey and Collard (2017) forcefully make this point when articulating how a capitalist society fundamentally relies on its ability to exploit social relations and nature that produce the formal economy; drawing from their paper, the *living from* category encapsulates much of this capitalist logic. This valuing logic is also encapsulated by the 'natural capital' approach, which was mentioned frequently in the literature and, like ecosystem services, mostly associated with *Living from* (for example, Xu et al. 2014; Adamowicz and Olewiler, 2016). While many proponents of this approach argue that non-economic arguments for nature and the protection of natural assets should be respected, arguments are frequently made along the lines of: 'if nature is priceless, then there is no obvious way of sorting out which assets matter most, where the efforts of conservationists should be concentrated, and which projects offer the greatest extra benefits' (Helm, 2016; 247).

While, not surprisingly, *living from* framings were largely exclusive of intrinsic values, relational values were reflected in the cultural aspects of subsistence and this could lead to perspectives that would moderate the more common instrumental perspective of substitutability of natural resources and commensurability of values (Bremer et al., 2018). For example, Allen et al., (2018) recognise the existence of relational values in agroecosystem governance, from the cultivation of traditional foods and ritual goods to the incorporation of traditional ecological knowledge. The authors here attempt to frame relational values as a middle ground for agroecosystem governance, towards multifunctional landscapes and land 'sharing' as opposed to the more conventional yield optimization and 'land sparing' associated with instrumental and intrinsic values respectively (Allen et al., 2018). Elsewhere, Kenter et al. (2011) found that communities in the Solomon Islands were unwilling to trade-off subsistence food gardens and traditional building materials against cash crops following deliberation of their cultural importance. However, the cluster analysis suggested that, more commonly, *living from* aligned with consideration of values as preformed and monistic, and with an emphasis on specific values and indicators over broad values. For example, Garcia et al. (2018) argue the need to focus on spatial and temporal issues in order to improve understanding of forest ecosystem services, to provide more accurate monetary values as indicators for policies and schemes such as Payment for Ecosystem Services (PES) (Reed et al., 2014).

Living *from* and Nature's Contributions to People

While there was little direct reference to NCP, as discussed above, NCP seen as ecosystem services have traditionally been focused on capturing the importance of nature as a means to human prosperity and livelihood security. This was demonstrated in the literature review as the *living from* frame was seen to map directly on to a variety of material NCP that related to provisioning and supporting Ecosystem Services. For example Russo et al., (2017) develop existing literature in Nature-Based Solutions and Ecosystem Services away from purely regulatory and supporting services towards more provisional services, suggesting a framework for research into Edible Green infrastructure, demonstrating the potential for novel approaches to understanding how we might live from nature. The most commonly other cited examples of these NCP were soil formation (Baveye et al., 2016; Breure et al., 2012; Gomiero 2016;), pollination (Brockerhoff et al., 2017; Chain Guadamarra et al., 2019; Cunningham 2017; Isaacs et al., 2009; Kremen, 2018), habitats (Jones-walters & Mulder, 2009) food & feed (Russo et al., 2017; Lynch et al., 2016; Perez Verdin et al., 2016; Rapidel et al., 2015; Ringler, 2008; Russo et al., 2017), energy (Cameron et al., 2012; Lundy, 2011), freshwater (Arlinghaus 2006), medicinal/genetic resources (Sivakumar et al., 2005; Abensperg-Traun, 2009) as well as maintenance of options (Momblanch 2016).

Living *from* and Total Economic Value

The *living from* frame in the literature strongly associates with TEV and its associated valuation methodologies and concepts. TEV is a conceptual framework grounded in the assumptions that the economic benefits of environmental assets, and that the monetary values produced would provide greater credence for the protection of the environmental assets in policymaking (De Valck & Rolfe, 2019; Derzken et al., 2015; Perez-Verdin et al., 2016; Ruiz-Sandoval et al., 2019). Indirect use values can be seen as related to fundamental values supporting prosperity, security and sustainability. Mehvar et al. (2018: 4), for example, reviewed the literature surrounding the economic valuation of coastal ecosystem services and split the values into three categories – 'direct use values', referring to items such as food or transport, 'indirect use values', such as flood control and storm protection, and 'non-use values' such as cultural heritage and biodiversity. Then, to calculate the 'total economic value' (TEV), revealed-preference methods (use-value), stated-preference methods (use and non-use value), market price and benefit transfer valuation methods were put forward and used to estimate the value of various coastal ecosystem services using data from 30 local and regional valuation studies. Such approaches rely on individuals assessing the value of the object in question, in this case coastal ecosystems, according to how it benefits themselves; these values are then aggregated. The *living from* frame associates with both 'use' and 'non-use' TEV categories. Use values reflect *living from* nature most obviously, whilst indirect use is associated with the regulating services and fundamental values that make *living from* nature possible. Non-use is reflected particularly in terms of option and bequest values associated with sustainability of use. Existence values, although conceptually still instrumental are more expressive of an environmental economic approach to *living with* framings (see below).

Living *from* in relation to indigenous and local knowledge

While economic approaches were strongly associated with *living from* framings, Many ILK traditions and practices can also reflect the *living from* nature frame, as often indigenous communities rely directly on the local environment for benefits and survival (Pecl et al., 2017; Reyes-Garcia et al., 2019); indeed occasionally approaches highlight both dimensions (Kenter et al. 2011). As Dam Lam et al., (2019) shows, indigenous values associated with *living from* are typically specific, relating to particular habitats that hold instrumental value for indigenous communities who directly rely on resources for provision. Gratani et al., (2016) highlight the importance of the *living from* frame for indigenous people too when mapping indigenous values in relation to Schwartz (1992) human values typology. Here Gratani et al., (2016) quote one indigenous participant as describing a local river,

'Bana is life to us, we cannot do without! It means everything to us! In Bana there is food, there is healing, we cannot live without water'.

It is important to note however that such studies rarely demonstrate indigenous people's values of *living from* the environment without referring to other life frames of *living with*, in and as. For example, Dam Lam et al., (2019) go on to point out such instrumental values alongside more relational understandings of the importance of the environment on a more systemic scale, referring to values attached to land and seascape elements such as rocks, wetlands, springs and forests that are indicative of high cultural and sacred importance.

Similarly, while Choy et al., (2018) demonstrate the importance of *living from* the environment for indigenous communities particularly in relation to the perspective of intergenerational justice, this is balanced by more less strongly anthropocentric worldviews and relational and intrinsic values that are suggestive of other life frames.

Living with

General perspective and association with worldviews

The *living with* frame was the second most prominent frame in the literature, being referred to in 34% of the articles. Papers linked to the *living with* frame often focused on people's contribution to nature – rather than nature's contribution to people – and notions of stewardship. This marks a shift from the anthropocentric perspectives associated with the *living from* and *living in* frames to more biocentric and ecocentric views that considers nature as important for itself, rather than just to human ends. Mace (2014) in her review of paradigm shifts within environmentalism and conservation, talks of an earlier period of understanding the value of 'nature for itself' and 'nature despite people', which both are set within a framing of *living with* nature. Similarly, Bugter et al. (2018) conducted a study into what were the more effective motivations that can be seen to drive conservation, finding that intrinsic value of the environment was consistently cited ahead of economic arguments.

However, *living with* frames in more recent times can also be associate with the more current framing of 'people and nature' which advocates more relational, interdisciplinary approaches to understanding integrated socio-ecological systems (Mace, 2014). For example, this transition over time can be seen in Duvall et al.'s (2018) conceptualisations of the ways in which nature in the city has been reframed from 'nature as relief' to then 'nature as boundary' to more recently 'nature as greening'. In this way, the *living with* frame relates to the growing research field looking into nature-based solutions and environmental management approaches that look to 'work with nature' (Bark et al., 2021). Importantly, nature within this context is not universally benign, and inclusive of all its disservices that we have to adapt to. The perspectives of what nature is 'like' to live with may thus vary. For example, Byg et al., (2017), in researching public perceptions of peatlands, see them described as 'the good, the bad and the ugly'. However, what is common to these perceptions is that nature is seen as having its own processes, forces and cycles that need to be considered. Whilst not primarily anthropocentric, this framing does consider nature as distinct from people (co-existence) and thus is often associated with a similarly dualistic epistemic worldview to *living from* (*Figure SM2.21*).

Elsewhere the *living with* frame also maps on to growing fields of research and associated literature in the areas of multispecies thinking and sustainability, as well as hybrid and animal geographies (Buller, 2014; 2015; 2016; Lorimer, Srinivasan, 2013; Rupprecht et al., 2020; Whatmore, 2006). This is particularly evident in ethnographic research approaches that to look to be more 'attentive' and attuned to other ways of *living with* species and habitats as part of humans very co-existence with the more-than-human world (Van Doreen et al., Ogden et al., 2013; Locke, 2018). However, this field

emerges more strongly with the *living as* frame, through its foundation in alternative indigenous ontologies (Todd, 2016).

The *living with* frame was also characterised by frequent explicit discussions of value change and formation as well as a strong plurality of values. For example, there were examples, where researchers recognised the need for a move away from more dominant instrumental approaches to valuation reflective of the *living from* frame (Ushedo and Ehiri, 2006).

Living *with* and broad and specific values

In terms of broad values, Cooper et al. (2016) point to notions of stewardship, responsibility and duty that arise from aesthetic and religious preservationism that defies the consequentialist logic of ecosystem services. In terms of justice, from the cluster analysis, one of the key concepts associated with the *living with* frame was recognition justice, reflected in the strong thread throughout the environmental ethics literature that has considered many ways in which the more biospheric and anthropocentric perspectives associated with *living with* are realised (des Jardins, 1997). However, procedural justice is also important, for example in discourses around 'greening deliberative democracy' where questions of political representation are not just concerned with the voices of future generations but also more-than-human species and habitats too (Eckersley, 2011; O'Neill, 2001). Retributive justice is important in the form of legislation that recognises the rights of protected species and habitats. A blind spot of this frame can be around distributive justice, where local people are excluded from resources in problematic examples of nature conservation (see *4.6.6*). Sustainability from a *living with* perspective focuses on the preservation of life support systems for the sake of nature itself. For example, conservation biology presupposes the notion that biodiversity is a fundamental moral good for this reason (Meffe and Caroll, 1994). With regard to sustainability-aligned values, the *living with* frame indicates both ethical and ecological concerns in the literature around adaptive management to prevent species loss and halting species extinction rates (Albrecht et al., 2013; Moritz and Agudo, 2013) as well as associated links with the NCP of maintenance of options around sustaining biodiversity for future generations (Volenec and Dobson, 2020). This does not mean sustainability-aligned values in the *living with* frame are necessarily geared towards biodiversity conservation that advocates expansion of protected areas but rather oriented towards opportunities co-existence, re-fostering harmonious human-nature connections, as reflected in the debate promoting land-sharing over land-sparing (Crespin and Simonetti, 2019).

In terms of specific values, the papers coded as *living with* often considered environmental protection or conservation as a means of preserving or helping the more-than-human world for its own sake, rather than merely for the benefit of humanity. This is evidenced through the substantial positive correlation the *living with* frame showed with intrinsic values ($Q = 0.62$, $\Phi = 0.31$). For example, Kabii and Horwitz's (2006: 13) review of motivations for participation in conservation covenanting programs shows that notions of stewardship and a strong 'environmental ethic' frequently trump profitability concerns as primary determinants of participation in the literature, once basic economic and survival needs are met (Dunlap and Van Liere, 1984; Langholz al. 2000).

However, highlighting the way in which multiple values can straddle different life frames, the *living with* frame also showed a moderate correlation with relational values ($Q = 0.44$, $\Phi = 0.22$). For example, echoing notions of relational value, Kabii and Horwitz (2006: 17) consider 'duty of care' relationships and how these might be conceptualized and conclude that command-and-control regulation is a typical solution in those papers suggesting that nature has intrinsic value (Kabii and Horwitz's, 2006: 17). This can also partly explain the prominence of reciprocal relationships with the *living with* frame too as Comberti et al., (2015) demonstrated with the common example of people who practice gardening not necessarily for the way in which nature benefits them but because they enjoy the practice which can be seen as benefiting nature.

Elsewhere the *living with* frame showed some associations with the relational values too where the underlying motivation or context was more reflective of an attempt to establish these kinds of human-nature relationships; for example, Skubel et al., (2019) advocate the use of relational values in the field of shark conservation to avoid the risks of only valuing sharks according to their use values indicated by their monetary, financial values alone. Similarly, Gardiner et al. (2013) investigate the ways in which urban vacant land might support arthropod biodiversity in certain U.S. cities, not only for the sake of humans, but for the sake of biodiversity itself. This suggests that the researchers view nature as intrinsically valuable as well as instrumentally valuable whilst exploring how human nature relationships may be more harmonious (Aggestam, 2015).

Living *with* and Nature's Contributions to People

Living with frame refers to regulating ecosystem services as well as the supporting material contributions to people. The NCP's coded in relation to the *living with* frame included habitat creation, for example, Gardiner et al., (2013) who point out the opportunities of urban habitats being created in correlation with the increase in relatively abandoned urban areas according to economic decline. Such an example points to the values of creating spaces for wildlife that may encourage co-habitation, fostering human-nature relationships with humans as opposed to focusing on preserving non-urban areas alone out of place where humans live. *Living with* is also associated with other NCP such as: maintenance of options (Bretzel., et al., 2016), air quality (McAlpine & Wotton, 2009; Escobedo et al., 2011; Rea et al., 2012; Ruiz-Sandoval et al., 2019), climate (Czúcz et al., 2018), ocean acid regulation (Graham et al., 2014) and hazard regulation (Cameron et al., 2012). However, these NCP are typically seen in light of fundamental ecological values that support both humans and non-humans. As mentioned earlier, the *living with* frame resonates with the increasing research interest in the nature-based solutions paradigm as well (Raymond et al., 2017). For instance Jorda-Capdevila and Rodriguez-Labajos (2017) discuss the multiple values and valuation methods that must be taken into consideration when evaluating the benefits of river restoration schemes. Such considerations look to evaluate measures in terms of benefits that derive from restoring nature, through humans recognising and appreciating the values of *living with* the environment.

Living *with* and Total Economic Value

The *living with* frame, owing to its move away from strong anthropocentrism and its association with intrinsic values, does not easily correlate with the use value component of TEV. However, on occasions there are examples where TEV as a framework is adopted by a researcher for either (i) the underlying motivation of ensuring the conservation of ecologically important habitats implying held values that are reflective of the *living with* frame, or (ii) there are ecological functions within the model that are expressive of the *living with* frame. For example, Dewsbury et al., (2016) draw on the regulatory services associated with the *living with* frame such as habitat creation (nursery function), nutrient cycling and improved sea water quality to ensure coral reef health (*Figure SM2.22*). Here, many of the ecological functions which precede the services that are economically valued, are not necessarily human centered and are more reflective of regulatory and supporting services that benefit both people and non-humans.

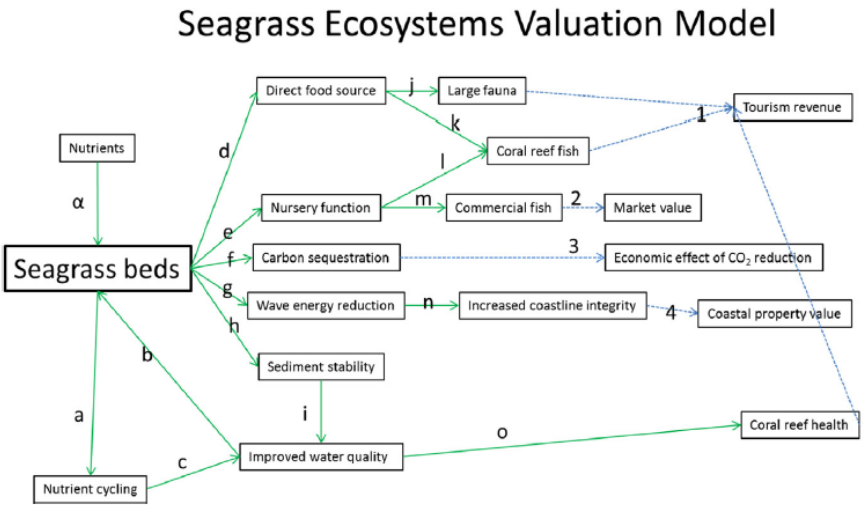

Figure 2. SM2.22 Model from Dewsbury et al. (2016) illustrating the ecological functions (green arrows) and associated services that can be valued using a Total Economic Value approach.

The *living with* frame can also be expressed through the notion of existence value. Existence value should not be confused with intrinsic value; conceptually existence value is still anthropocentric, as it reflects the value to a human person of knowing that nature will continue to exist, and thus economic measures of extrinsic value elicited through stated preference approaches such as contingent valuation are unable to fully capture intrinsic value (Aldred, 2006). However, the framing that is offered in contingent valuation can align with a *living with* perspective that reflects the existence of nature independent of people *living from* or in it.

TEV can also connect to the *living with* frame in terms of valuing the way in which biodiversity existed before and will exist after humans sustaining the services that have developed through evolutionary processes (Faith et al., 2010). However here, as elsewhere, critiques and cautions are rife in terms of the ambiguity of these methods (e.g., scope issues around valuing individual species versus ecosystems) as well as the moral implications, e.g., many people refuse to respond to Willingness-to-Pay surveys (Polasky et al., 2005). With a similarly minded critique, Choy (2018) demonstrates the shortcomings of methods such as Cost-Benefit Analysis (CBA) in capturing the non-use and indirect use values of the environment in the context of indigenous communities in Malaysia, where CBA falls short both in its assumption of the substitutability of the environment as well as its inability capture the non-market values that are reflective of many indigenous people's relationships with nature.

Living *with* in relation to indigenous and local knowledge

Indigenous and local knowledge is important to both nature conservation and also management of regulating NCP, though this knowledge is not always recognised. For example, Rautela (2005) points out how risk and disaster management often ignored valuable indigenous technical knowledge. They note that traditional forms of knowledge have developed over time to include many effective mitigation measures to cope with earthquakes, floods, landslides and droughts - examples that are reflective of the *living with* frame. Similarly, Reyes-Garcia et al., (2019) highlight the contributions ILK can make in the restoration of landscapes and ecosystems in both the selection of species for site

restoration but also for historical information about specific ecosystem management both of which closely reflect the values associated with *living with* the environment.

Living in

General perspective and association with worldviews

The *living in* frame was the third most coded frame, accounting for 30% of the literature. The majority of papers coded as *living in* pointed to the value humans attach to place, or their location within their environment as a source of cultural or individual identity as well as being a backdrop and stage to our life's events, our natural and cultural heritage and the sense of place that we form in *living in* our local environments. Environmental features such as lakes, mountains, parks, species, local climates or a neighbourhood layout can all determine place and community (Kim and Kaplan, 2004; Pendola and Gen, 2008).

The *living in* frame can relate to both monetary (Hermes et al., 2018, Spanou et al. 2020) and non-monetary approaches of valuation to inform environmental management (Fish et al. 2016; Church et al. 2014), though the former can impede the latter, for example by reducing the importance of symbolic meaning (Folkersen, 2018; James, 2016).

The epistemic worldview of *Living in* approaches is more interpretivist than *Living from* and with, because of the specific meanings that determine place, and place-attachment, in the interactions between physical spaces and sociocultural construction and interpretation (Coates et al. 2014; Fish et al. 2016, Azzopardi et al. 2021). The most common environmental worldview associated with this frame is weakly anthropocentric and relational, though this can extend into more pluricentric perspectives, particularly in indigenous cultures, for example as expressed in peoples' relationships with the land (Bremer et al., 2018; Stephens & Athias, 2015; Strang, 2005). As such, *living in*, through understanding nature as place, landscape and land, can bridge the epistemic and human-nature relation worldviews of the other three frames (*Figure SM2.22*).

Living *in* and broad and specific values

Living in highlights broad relational values such as belonging and heritage (Azzopardi et al. 2021), but also more hedonic values such as life enjoyment, excitement, opportunity and freedom (Spanou et al. 2020). In terms of justice, there is an emphasis on procedural justice in terms of people's ability to participate in and exercise control over the management of places they live, where different ways of understanding, defining and managing place can lead to conflict (Aa et al., 2010, Buijs et al., 2011). Sustainability can also be understood from a more sociocultural perspective, where the emphasis is not on sustaining nature as resources (*living from*) or biodiversity (*living with*) but as a particular place or landscape (Buijs et al. 2011) or as heritage (Azzopardi et al. 2021). However, natural and cultural heritage conservation can come together in a more integrated way through the concept of biocultural diversity. Elands et al., (2019) for example, articulate the biocultural diversity concept through the practices by which people develop a relationship with specific places they live, work or recreate in.

With regards to sustainability and sustainability-aligned values, the *living in* frame, in highlighting the importance of cultural landscapes and heritage, recognises that these are not simply values and

features that we have inherited from the past for the present, but that we are constantly shaping cultural landscapes that provide a sense of place and heritage values to future generations as well (Bürgi et al., 2017). However as Fredengren (2015) point out, there can be tensions between understandings of cultural heritage and sustainability; heritage conceived as merely social construct can privilege the role of culture at the expense of disregard and degradation of nature. Instead, Fredengren (2015) advocates for thinking of heritage-as-phenomena that might recognise the role and agency of material landscapes and more-than-human world in co-shaping heritage. This again highlights the way in which the *living in* frame in some cases can be considered through non-dualistic worldviews (also see Kenter & O'Connor, 2022).

In terms of specific values, the importance of *living in* the natural world is predominantly linked with relational values, which was demonstrated through a strong positive correlation ($Q = 0.81$, $\Phi = 0.48$). 'Relational values' as a moral justification that focuses on the relationships as the object of value, reflect the sense of importance people ascribe between humans, identities and the sense of place. Many papers coded as *living in* discuss place attachment and the relationship between human identity and place (Bremer et al. 2018). This reflects the growing emphasis on valuing the environment on the basis of the non-substitutable relationship between humans and nature and the importance of considering our place in the natural world, albeit from an anthropocentric point of view. For example, Ishihara (2018) borrowing insights from sociology discusses how relational values that people hold with nature are internalised and reproduced in routine cultural practices. Such conceptualisations focus on the dynamic characteristics of values that pay specific attention to relationships between people, culture, and place that is defining of the *living in* frame. Embodied values were also associated with this frame, where people express their relationships with places in their practices, and also in terms of the 'affordances' that environments enable in terms of people's actions through their biotic and abiotic features, and other living creatures in it (Raymond et al. 2017). This is another place where the *living in* frame can meet the *living as* frame which extends embodiment into a more explicitly non-dualistic perspective of people and nature (Kenter & O'Connor, 2022).

Place-based relational values such as place attachment and identity are central within *living in*. Gifford (2014: 559–61), explores the psychology of place attachment and identity, a field that is developing but 'remains uncrystallised' (Lewicka, 2011). He considers literature – the work of Brown et al. (2003) and Hay (1998), for example – that points to the non-material contributions of environmental settings in terms of emotional or spiritual ties to certain locations formed through experience and memorable events. This initially creates a 'place attachment' relationship for an individual or community which then evolves over time into a sense of 'place identity' (Clayton, 2003). Place attachment and identity can also be faith based, whereby the meanings of certain places become 'elevated to the status of sacred' for those who are religious (Gifford, 2014: 561; Mazumdar and Mazumdar 2004). These ideas of understanding the importance of *living in* the environment can also be drawn out using multiple methodologies, for example, Franco et al., (2017) talk of the importance of multiple senses, beyond vision, in order to understand values associated to place attachment. This again relates to the strong association between *living in*, place and embodied values that emerged from the cluster analysis, pointing to the way that the *living in* frame embeds individuals and communities within their environments.

Gifford (2014: 560) also considers the material contributions of land and seascapes, noting the obvious importance of 'physical place'. Thus, particular environmental features – such as lakes,

mountains or parks – a location's climate or a neighbourhood layout can all determine place attachment or identity by promoting a sense of community (Kim and Kaplan, 2004; Pendola and Gen, 2008). Westlund (2010) for example demonstrates through global case studies the role that 'place', understood as embeddedness within local ecosystems, often plays the role of an active participant in processes of peace and conflict resolutions. This same notion of embeddedness and "*living in* nature" could be related to the Japanese concepts of *satoyama* (里山), *satoumi* (と里海) and *fūdo* (風土). (Takechui, 2010; Takeuchi et al., 2014; Kumagai, 2017; Baek, 2013; Janz, 2011). Satoyama' and satoumi have been advocated as useful concepts to consider in the context of building resilience in communities, with the ideas referring to the interdependence, or mosaic-like relationships between people, natural habitats, species and wider ecosystems (Takechui et al., 2014). Specifically, *satoyama* refers to these interdependent relationships in the context of agricultural landscapes, whereas *satoumi* points to such relationships in coastal areas between the sea and those who live near it (Duraiappaah et al., 2012; Takechui, 2010; Takechui et al., 2014). *Satoyama* is inspired and based upon the integration of natural resources management with traditional knowledge approaches (Takeuchi, 2010).

The notion of *fūdo* was re-investigated by the philosopher Watsuji Tetsero as well as the geographer Augustin Berque to describe the notion of *milieu*, or the idea of being in the middle of comprehensive socio-ecological systems interacting in any given place (Droz, 2018; Janz, 2011; Keichi, 2017). Influenced by Heidgegger and ideas of 'being in the world', it recognises this fundamental embeddedness of human existence (Janz, 2011). This notion of *fūdo* moves beyond nature-culture dichotomies that are characteristic of western thinking to conceive of places in terms of natural and cultural systems as interdependent; e.g., climate affects culture and culture can affect the climate (Droz, 2018; Janz, 2011). This is important in terms of considering how cultures must learn to adapt to a shifting climate. Importantly Keichi (2017) notes the idea of *fūdo* can be applied at different scales, drawing out the implications of this way of viewing the world at local, regional and national scales.

Relatedly, Keichi (2017) also links the concept of *fūdo* to Massey's (2005) influential work on the concept of place, particularly the 'throwntogetherness' of place resulting in a constant 'negotiation between the human and more-than-human' (Massey, 2005, pg. 140). These varying ideas strongly relate to the *living in* framing of values, where humans find themselves situated in the middle, or *milieu* of both social and ecological worlds (ecosystems) and where we both shape and are shaped by the natural and cultural environments we find ourselves in. This notion of being embedded within our environments further explain associations between 'embodied values' and the *living in* frame.

The *living in* frame also includes other moral justifications. In the review sample, there as no significant positive or negative association with instrumental values, and a weak to moderate positive correlation with intrinsic values ($Q = 0.33$, $\Phi = 0.13$). This also highlights how broad relational values, such as care and community, can link the living in frame to the living with and as frames (e.g., Britto do Santos and Gould, 2018).

Living in and Nature's Contributions to People

The *living in* frame associated with a mix of material and non-material NCP, particularly physical and psychological experiences (Nesbitt et al., 2017), learning and inspiration (Lintott, 2006) and identities (Poe et al., 2014), and some regulating NCP such as water quality (White et al., 2010) and

habitats (Arkema et al., 2017) were also coded in this frame, owing to the way in which vital ecosystem functions and services can contribute to how people relate to their environments.

Living in and Total Economic Value

The most relevant TEV categories with regard to *living in* are indirect use values and bequest values. For example, Spanou et al. (2020) considered indirect use values through hedonic valuation, assessing positive and negative effects on house prices of both physical changes in place (new fish farms), and nonmaterial changes (designation of scenic areas and protected areas). However, as with *living with*, there are limits to which the values associated with *living in* can be captured within a TEV approach, because relational values are often not substitutable, or amenable to trading off (Apostolopoulou and Adams, 2017).

Living in in relation to indigenous and local knowledge

The *living in* frame was the most closely clustered with ILK in the literature review of the four life frames. Many of the papers that explored ILK also considered the importance of appreciating how we live in the natural world, the importance of place and the importance of our relationships with the environment. For instance, in Ekblom et al.'s (2019: 2) review of the potential for biodiversity protection in sub-Saharan Africa, they consider the role of ecosystem memories and place memories as key constitutive elements of 'biocultural heritage', a term used to encompass 'the natural–cultural components of human–environment interactions including knowledge, practices and innovation'. 'Ecosystem memories' refer to the biophysical properties of non-human organisms that affect how humans physically shape the ways that cultures and communities relate to place, such as 'fire break' local land management practices common in the Chyulu area of Kenya and Zambia (Ekblom et al. 2019: 4). The Chitemene system in Zambia is especially known for promoting pasture and fertilisation of farms, whilst also protecting individual trees and creating effective clearings to prevent fires spreading (Eriksen, 2007). 'Place memories' refer to the 'intangible living features of human knowledge and communication: know-how, place names, orature, arts, ideas', focusing on how humans socially shape how cultures, communities and individual relate to place (Ekblom et al. 2019: 6). Sacred areas – often ancient or community burial areas, or old settlement sites that local communities strive to preserve – are a good example of these (UNESCO, 2005; Mgumia & Oba 2003; Bhagwat et al. 2014). Such areas exist throughout Africa, and some have become 'havens for old growth forests'. For example, a study in northern Tanzania located 290 sacred sites, which, although small in size, collectively cover a total area of 370 hectares (Ekblom et al. 2019: 6; Akida, 2006). A similar perspective is offered by Cocks (2006) who critically explores the notion of biocultural diversity, taking it beyond application to ILK studies alone. Cocks (2006) understands the term to capture the dynamic relationship, exchange and re-articulation of traditions and practices that both connect people and landscapes. These examples illustrate the importance of understanding the *living in* frame from both a social and physical perspective – as well as any associated relational values – when considering ILK. Lastly, Fernández-Llamazares and Cabeza (2018) also pick up on the way in which memories as well as knowledge and biocultural diversity are often passed down through the medium of storytelling in Indigenous cultures. Fernández-Llamazares and Cabeza (2018) argue that storytelling ought to be recognised as an epistemological approach to improving conservation practices not least because it can help foster a sense of place, tying in with one of the key concepts of the *living in* frame.

Living as

General perspective and association with worldviews

The *living as* frame was the least prominent in the literature, accounting for 9% of papers coded. This frame represents a key departure from the previous three frames in that it conceives of human–nature relations as non-dual (O'Connor and Kenter, 2019). The importance of this frame has been re-stated (Kenter & O'Connor, 2022) for its inclusion of epistemic worldviews and nature ontologies that do not assume boundaries between subject and object (Viveiros de Castro, 2004) or self and environment (Glaser, 2006; Strang, 2005). Thus, papers coded as *living as* discussed humans' non-separateness from nature, whereas those coded only to one or more of the other three frames did not, marking a shift from the dualistic epistemic worldviews that are dominant in the west and in scientific literature and making this fourth frame more inclusive of non-western worldviews and ways of valuing nature (Kenter & O'Connor, 2022). This correlates with the epistemic justice considerations in *Chapter 2* and *Chapter 5*.

The environmental worldviews associated with the *living as* frame marks a distinct move away from anthropocentrism as a moral orientation. For example, several papers advocate Arne Næss' (1973) ecocentric, Deep Ecology perspective, where humans and nature are viewed as one biotic community (Glaser, 2006; Ims, 2018). For example, in her review of human–nature mind maps, Glaser (2006: 123) considers the view that human and non-human species are part of an 'organic whole' where a single 'web of life' contains potential for sustainable and harmonious nature–human relations. Moreover, she notes how the deep ecology perspective emphasizes human psychological and spiritual connectedness to nature, 'suggesting that if the human sense of "self" is widened and deepened, concern for nature logically and "naturally" ensues' (Glaser, 2006: 123). Other papers embrace Leopold's ecocentrism in the same way, considering the argument that humans are part of, and embedded in, nature and exploring the implications of this for sustainability (for example, Chun, 2005; Beau, 2015). Some of these traditions include personification or *prospopoeia*, where people may speak as another person or object (e.g, as in Leopold's "Thinking like a mountain") (Moore, 2008). This can also be undertaken by a biocultural mediator performing a spiritual role.

Bratton (2018) points to similar notions in many indigenous ontologies and world religions, through articulating the concept of eco-dimensionality; this concept is the 'integrative expression of environmental values, caretaking norms and sustainable practices in all aspects of religion, including symbolism, myth, art, ritual, and ethics, that recognizes and specifically adapts to keystone environmental processes and ecosystemic or geo-physical diversity'.

The body of literature that the *living as* frame also encapsulates has been characterised by an 'ontological turn' towards work that has emphasized the agency of the other-than-human or, within this frame more accurately the more-than-human world (O'Connor and Kenter, 2019), in our understandings of reality as well as the role of affect in shaping our understandings of the world and how we approach knowledge (Singh 2018). The ascription of agency can then give rise to the relationships between these centers that form multiple and diverse intrinsic, relational and instrumental grounds for moral standing reflected in pluricentric and relational environmental worldviews (*Figure SM2.22*). This understanding of agency is not limited to living beings, as is also common in the *living with* frame, but can extend to diverse natural entities that can be considered to

harbour a purposive consciousness. For, example, the Rig Veda in Hindu culture takes the following perspective of water:

> *"Ya apo divya uta va sravanti*
> *Khanitrima uta va yah svayamjah*
> *Samudrartha yah suchayah pravakasta*
> *Apo deviriha mamavantu."*
> *(apah suktam, Rigveda, V11.59.2)*
> *May the waters that are in the sky, or those that flow (on the earth) those (whose channels) have been dug, or those that have sprung up spontaneously and that seek the ocean, all pure and purifying, may those divine water protect me here (on earth)*

Agency of the more-than-human is also exemplified through the associations between the *living as* frame and the growing scholarship around multispecies thinking and sustainability (Van Doreen et al., 2016; Ogden et al., 2013; Rupprecht et al., 2020). This work builds on approaches within geography that can also be mapped on to the *living as* frame, in their explicit challenges to the established ontological positions within the discipline that looks specifically to unsettle the dominance and distinctiveness of human perspectives through hybrid nature-culture geographies (Whatmore, 2006) and animal geographies (Buller, 2014; 2015; 2016; Lorimer & Srinivasan, 2013). Van Doreen et al., (2016, pg. 5) identify the commonality between these varying schools of thought as focusing on 'a better understanding what is at stake—ethically, politically, epistemologically—for different forms of life caught up in diverse relationships of knowing and living together'. This reflects the *living as* frame well in challenging the basic western philosophical assumptions about the centrality of humans' places in the world as unique and above that of the more-than-human world. In only positing worldviews based on nature as separate, and mostly instrumentally valuable, nature becomes relegated as a passive backdrop to human values and practices. However, in recognising the many sustainable and alternative ways of *living as* the natural world, or in harmony with the natural world, this frame shines a light on the values that work in harmony with nature. For example, Sheremata (2018) describes an Inuit community's relational values with nature, where everything is 'taken to be alive', fostering a sense of respect and awareness of the more-than-human world. Elsewhere, Davies (2015) illustrates the implications that might follow in the fields of law and planning, if we were to examine more closely the idea of consciousness in trees, in terms of their agential capacities in resisting human laws and interventions.

These notions can fundamentally challenge preconceptions of how values have been conventionally understood in mainstream economics and western environmental philosophy. Instead of values being pre-formed and constant, values come to be seen as more dynamic and open to changing. This could be seen through the high level of association with the *living as* frame and Value Formation and Change (VFC) ($Q = 0.20$, $\Phi = 0.63$). Papers associated with this frame also frequently noted addressing disconnections from nature as a key vector for environmental value and policy change. These understandings also emerged from the cluster analysis with terms such as 'transformative purposes' and 'reciprocal values' where notions of human-nature relationship shifted from a dualist perspective, reflective of the other life frames (*FigureSM2.22*) to this more holistic, embedded notion of *living as* the natural world.

Living as and broad and specific values

The *living as* frame steps away from an anthropocentric worldview, and this is reflected in it being negatively correlated with instrumental values (Q=-0.62, φ=-0.21) and significantly correlated with both intrinsic values (Q=0.68, φ=0.25) and relational values (Q=0.78, φ=0.28). This reflects associations in parts of the relational values literature that emphasizes that being engaged in a non-substitutable relationship with nature implies that we are not separate from it (Muraca, 2011). Values in this framing then are both broad and specific, ranging from values about certain features of landscapes to more general senses of importance about relationships and practices. The emphasis on non-separateness and relationship supports broad values like awareness, responsibility, respect, reciprocity, kinship and self-realisation. However, as discussed above, this frame challenges understanding of values more deeply, seeing them as embodied, reciprocal and dynamic, rather than just mental constructs. Because broad values within this frame may also be expressed in a more experiential and embodied, and less abstract way, they are interpreted and expressed within context. For example, Gould et al. (2019) points to notions such as balance and harmony in indigenous Hawaiian culture, which are not seen as abstract life goals but as a way of living and expressing specific relationships with nature and other people. Consequently, the notion of relational values within this frame closely entwines the broad and specific concepts of value.

One emergent theme from the analysis of the *living as* frame was in relation to a paradigm of valuing nature in relation to existing valuation frameworks such as NCP and ES was that of valuing nature as biomimicry (Dicks 2017; Benyus, 1997). While this is also characteristic of the *living from* and *living with* frames, in terms of ecosystems as sources of inspiration, and valuing the importance of living alongside ecosystems, species and habitats, it points to an ontological shift that is more reflective of the *living as* frame. For example, in describing indigenous perspectives on knowledge formation, Sheremata (2018) recounts the idea of learning from nature from a young age as being a key part of forming a worldview that is characteristic of *living as* nature; specifically referring to the way in which Inuit people 'learn from the weather' to anticipate sudden changes.

The *living as* frame has strong associations with *sustainability-aligned values* through its emphasis on the potential for transformative ontological shifts (Kenter & O'Connor, 2022). This may be indicated through calls for a re-evaluation of ways of being, or livelihoods, to establish more harmonious ecological connections and fundamentally challenge more dominant consumer cultures in affluent countries (Ims, 2018). Or this may be in the form of proposing non-dualist ecological ethics and principles for environmental policy. For example Paterson (2006) outlines, in the context of wildlife conservation, the alternative Buddhist approach of philosopher Diasaku Ikeda which is founded upon a respect for the rhythms, processes and phenomena of the natural world and characterised by the idea of the oneness of life; in this way conservation does not remain a question of managing nature for and with people but instead becomes one of making people aware of their pre-existing wider ecological relationships.

Living as and Nature's Contributions to People

The dualistic concept of NCP is less easily applied here (Kenter, 2018) (also see section below: *The life framework and the IPBES conceptual framework*), but there are examples in the literature of some relevant NCP such as habitats (Lepofsky & Caldwell, 2013), companionship (Bremer et al., 2018) and identities (Ainsworth et al., 2019). Crucially, within the *living as* frame, NCP are likely to be tied

to reciprocal contributions of people to nature, such as, as Lepofsky & Cladwell, (2013) point out from historical ethnographic and archaeological data in the Northwest coast of (now) USA, nature 'enhancement strategies' providing the example of the construction of 'clam gardens' either through a variety of techniques from the removal of rocks in holding ponds and selection of only adult sized clams for consumptions. Similarly, Comberti et al., (2015) demonstrate reciprocal land management techniques from indigenous communities such as earthworks that altered and enhanced the topography and biodiversity of land in the Amazon, challenging the traditional conceptions in the West of the Amazon as a wilderness, i.e., void of human interactions. Thus, practices of care may be valuable not because of the way in which nature contributes to people as a one directional benefit, but rather through the reciprocal relationships and values. These are important ways of interpreting the broad values of good quality of life highlighted by the IPBES framework in terms of '*living in harmony with nature'* and *'relationship with mother earth*' (Diaz et al., 2018) (also see section below: *The life framework and the IPBES conceptual framework*).

Living as and Total Economic Value

The *living as* frame least connects to TEV. Fundamentally, the TEV framework is based on the estimation of willingness to pay that is assumed to reflect satisfaction of human preferences related to use and non-use of environmental goods and services. However, value within the *living as* frame is not typically considered through preferences but is rather derived from a oneness of being. For example, in the UK marine case study (*Annex 2.5*), a participant expresses the importance of the sea: "No, it's just you feel part of it, it's like being a plant. I felt like a plant that had gone back into the right soil when I came here to live." This relational value is not expressed as a preference, and can't easily be associated with a TEV category, because the sea is ascribed a value that goes to the core of someone's being. A TEV approach may estimate the indirect use value of the sea to this person based on, e.g., modelling housing demand relative to distance to the sea (e.g., Spanou et al 2020), but, as is well recognised in the cultural ecosystem services literature, this does not do justice to the underlying values (Daniel et al. 2012; Milcu et al. 2013; Cooper et al. 2016; James, 2016; Kenter, 2016; Raymond et al. 2017; Ainsworth et al. 2019; Spanou et al. 2020).

Living as in relation to indigenous and local knowledge

The *living as* frame is not exclusive to indigenous people and can also be recognised in the west (O'Connor and Kenter, 2019; Harmáčkova et al., 2021), both in empirical study and in approaches such as Deep Ecology. Furthermore, not all indigenous people may emphasize this frame, and those who do also ascribe importance to other frames, as discussed above. Nonetheless, it is important to recognise that the *living as* frame in its associated body of literature and research is frequently associated with indigenous ontologies; indeed, much of the literature referred to above has been pointed out to be indebted to these indigenous and generally marginalised voices that western, euro-centric conceptual frameworks have often left out (Todd, 2016; Sunderberg, 2014). ILK perspectives often considered notions of non-duality and connectedness to nature. For example, in their assessment of local-level criteria and indicator frameworks as a tool for assessing Aboriginal forest ecosystem values, Adam and Kneeshaw (2008) discuss the Aboriginal notion that there is no separation between culture and nature, nor society and environment. Such notions reflect a non-dual perspective on nature-human relations. Similarly, Strang (2005) explains how many indigenous peoples conflate a sense of nature with the sense of self, enabling subjective identification with elements of the

environment and supporting long-term affective relationships with place. An example of this is presented by Zent's (2013) extensive study of the Jotï, Amerindian people in Venezulan Amazon, and their 'ecogony', which articulates on a daily basis notion of interdependence, humanity and person through the relations that are specific to the place, and all of its biotic and abiotic components, which in turn are each conceived of as potential subjects with awareness, creativity and moral perspectives.

In terms of methods of understanding values of the environment, indigenous storytelling is often referred to as ways of conveying significance of environments that incorporate local environments and changes to community identities (Fernández-Llamazares & Cabeza, 2018). Relatedly, Sheremata (2018) sets out the importance of listening to relational values in including ILK perspectives in environmental governance, stating that relational values opens up the inclusion of culturally-specific narratives relevant to the priorities of indigenous peoples in decision-making.

Seeking balance: life frames, risks and policy

The natural world does not always deliver benefits that we find to be important or valuable; from flooding, droughts, storms, pests, diseases, earthquakes, predators, nature is not always in service to humanity. Within the IPBES framework, these disservices to people's quality of life are also called negative contributions or negative NCP (Diaz et al. 2019). Much research commonly discusses the costs and benefits of ecosystem management approaches that can lead to disservices and negative NCP, such as jellyfish blooms (Graham, et al., 2014) or insect herbivores that can act like pests (Maguire et al., 2015). These approaches typically call for frameworks to consider more holistic approaches to conflicts and trade-offs whilst attempting to inform the public of the various risks associated. Effective management of nature then seeks to balance negative and positive NCP - which may benefit or disbenefit the same or different social groups (Gutierrez-Arellano and Mulligan, 2018) along with other values in relation to nature. The life frames provide a policy vehicle for such an approach.

Seeking balance has been a long existing feature of some peoples' interactions with nature. For example, Takeuchi (2010), when outlining the features of *satoyama*, a Japanese term for a mosaic of habitats and species, including people, between mountains and agricultural land and villages (see above), talks about the key feature of *balance* that is associated with *satoyama* in its ability to sustain and restore a good relationship between people and nature. However, the author points out both over-uses and under-uses of the *satoyama* region as having had at times negative consequences. Here they go on to describe the 'Satoyama Initiative' as an approach to restore balance in these social-ecological systems.

Within the life framework, we conceive of an approach to balance in terms of the diverse social-ecological risks of over- or under-emphasizing different life frames, based on known issues and concerns within the literature (*Figure SM2.23*). Risk as a concept is intimately related to values and in the context of environmental policy and management can largely be framed in terms of the potential negative impacts resulting from how humans transform the natural world in order to improve lives, meeting human needs and values (Pidgeon, 2020). Often, in such transformations, unintended consequences or side-effects may occur that can harm other human needs and values. These risks include various ecosystem disservices or negative contributions of nature, but also social risks such

as conflict between different social groups or between policy makers and their constituents, ethical risks including various justice concerns, and social-ecological risks such as a lack of ability to adapt to environmental change. The life framework can help to assess, communicate and address these risks.

There is no 'single' or 'universal' balance that is correct as human nature-relationships are complex, context-specific as well as abstract and are based on plural values and ways of knowing, epistemologies (Colloff et al., 2017; Reyers et al., 2013; Martinez-Alier, 2003; Kenter et al. 2019). Thus, what we come to consider as risk-worthy, and which risks are prioritised, becomes a consideration of evaluation. Policy makers make choices as to which frames are emphasized in valuations and decisions. Any decision about their prioritisation leads to different value outcomes that create winners and losers and is intimately associated with questions of justice and power (Martinez-Alier, 2003; Kenter et al. 2019). Explicit recognition of multiple values and knowledges in valuation and policy enhances procedural justice and improves the quality of more inclusive, democratic decisions (Tengö et al., 2014; DeVente et al. 2016).

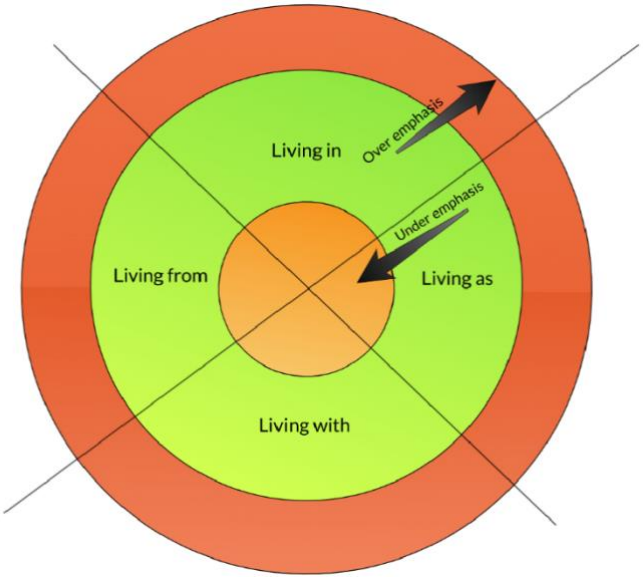

Figure SM2.23 Representation of areas of under- and over-emphasis of life frames.

Risks of over- or underemphasizing different life frames

Table SM2.11 presents an overview of key risks of over- or under-emphasis across the life frames. We will briefly discuss some of the examples in more detail here. The subsection of ***Living from***, from the section **Seeking balance: life frames, risks and policy** of this annex will then discuss in more detail how the life framework can be applied within this context, both in an abstract and more context-specific sense. The approach also resolves questions around how the life framework can include negative values of nature, including notions of living against, in spite of, disconnected from, or without care for nature.

Living from

The most frequently cited example of over-emphasis on the '*living from*' frames is the way in which promotes over-exploitation of natural resources and increase in agricultural practices of monocultures across the world leading to a global loss in biodiversity and species extinction. This is often referred to as the greatest cause of our current climate and ecological crises (Adekola and Mitchell, 2011;

Danielsson, 2005; Hails & Ormerod, 2013; Hicks, 2011). Overemphasizing *Living from* nature has been made evident by the MA (2005) and again by the IPBES Global Assessment, which highlighted how *living from* can become living against nature when there is a narrow focus on production of material benefits whilst degrading biodiversity and regulating and non-material NCP.

However, underemphasizing *living from* can also lead to importing NCP and exporting ecological footprint (Fuchs et al., 2020), rather than reducing domestic consumption of material NCP (e.g., through dietary change). Food security can also be threatened by overemphasizing *living from*, e.g., where financial maximisation leads to switching from subsistence to cash crops (Fazey et al., 2011; Gomiero, 2016).

Living with

As demonstrated through the associations between the *living with* frame, and regulatory ecosystem services and contributions to people that *living with* nature can offer, this frame also relates to IPBES (2018) framings around good quality of life as *living in* harmony *with* nature. This also is reflective of various green policy approaches that are gaining increasing traction, including Nature-Based Solutions (NBS) (Raymond et al., 2017), Blue-Green Infrastructure (Kati & Jari, 2016) and Biomimicry (Dicks, 2017), pointing to the idea of recognising the value or the importance of *living with* and working with the natural world in that it can regulate pests and diseases, storms and disasters, improve human health and support adaptation to climate change. This points to the risks associated with underemphasis of this frame as we overlook the significance of *living with* multiple species and biodiverse habitats, i.e., for its regulating contributions in preventing disease outbreaks, wildfires, droughts, floods, pests etc. For example, the increase in likelihood of future pandemics linked to biodiversity loss; COVID-19 crisis highlights a major risk from underemphasizing *Living with* nature, where ecological degradation increases emergence of infectious diseases (Jones et al. 2008; Keesing et al. 2010; Gutierrez-Arellano and Mulligan, 2018; IPBES, 2020). On the other hand, overemphasis can lead to mismanagement of negative NCP (ecosystem disservices) (Lyytimäki and Sipilä, 2009) as well as human-wildlife conflicts and backlashes from local people reliant on nature (Redpath et al. 2013). Another common risk attached to the over-emphasis of the *living with* frame is the displacement of many communities who, having previously been living harmoniously with nature, are evicted from the predominantly western worldview that people must be excluded from nature in order to protect it (Bray &Velazquez, 2009; Chicchon, 2009; Comberti et al., 2015).

Living in

Perhaps the most extreme risks of overemphasizing the *living in* frame can be the belief that people who are not endemic to an area (i.e., refugees, asylum seekers, migrants and those descended from migrants) ought to be excluded from it, as a basis for ideologies such as eco-fascism (Lubarda, 2020), but also in a more moderate form presenting a potential source of social exclusion (Shucksmith, 2012). Overemphasizing *living in* frames also risks under-recognition of fundamental values and regulating NCP, such as in unsustainable tourism (Hicks, 2011), or resistance to changing landscapes where people are so attached to certain features that preserving and clinging on to natural and cultural heritage may in itself be unsustainable (DeSilvey and Harrison, 2020). In contrast, under-emphasis can lead to a poor recognition of local and place-based concerns and over-generalisation of values. An example of this can be seen when the planned privatisation of part of UK national forests led to local protests to safeguard place-based values, which eventually forced a policy reversal (Kenter et al. 2014, 2015).

Living as

The *living as* frame, by reflecting a non-dual ontology and epistemic worldview, denotes the sense with which many people identify the environment and its features to be a part of their self-identity.

However this same premise in itself can also lead to a misuse and a justification for exploiting nature through the belief that humans are nature and therefore all actions are considered 'natural'. This kind of hubristic and domination-oriented approach to environmental management can lead to ethically controversial ideologies such as eco-modernism and a form of post-environmentalism (Albrecht et al., 2013; Štante, 2010). Overemphasis of *living as* framings can also be lead to injustices of people when by virtue of their closer associations with nature are seen as either uncivilized or as 'noble savages', or can lead to an under-recognition of environmental impacts of indigenous people (Diamond, 2003; Raymond, 2007). Underemphasis of *living as* bears substantial issues of recognition and epistemic justice when embodied values and local, experiential knowledge are not accounted (Jackson and Barber, 2013). More broadly, our increasing disconnection from nature through urbanisation and loss of green spaces has been signalled as a major risk to eco-literacy and human wellbeing (Cumming, 2016). This relates to another risk associated with the underemphasis of the *living as* frame, where nature is over objectified and abstracted such that people lose their connection to nature. Linton (2010) explains this in the context of water management where the focus on water as part of the hydrological cycle and as an abstraction in the form of H_20, that we have underemphasized the social relations that we have with water, which he terms the 'hydro-social'. (Over)-abstractions of nature are seen as more prevalent in contexts where technical expertise and approaches to managing human-nature relationships are prioritised over more situated approaches (Cumming, 2016; Linton, 2010).

Table SM2.11 Examples of risks and concerns arising from over- and underemphasizing different life frames from the literature.

	Living from	**Living with**	**Living in**	**Living as**
Risk of over-emphasis	• Overexploitation of natural resources beyond their ability to regenerate (Adekola and Mitchell, 2011; Danielsson, 2005; Hails & Ormerod, 2013; Hicks, 2011) • Negative effects of technology to address environmental impacts (Lyytimäki, & Sipilä, 2009) • Narrow focus on • material and short-term benefits (Danielsson, 2005) • Degradation of regulating and non-material NCP (Adekola and Mitchell, 2011) • Loss of biodiversity (Hough, 2014; Van der Knaap, 2013) • Reduction in food security and reliance on imports (Fuchs et al. 2020; Ringler, 2008)	• Colonial conservation, e.g., eviction of local people in name of protecting 'wild nature'; restriction of hunting sea mammals by Inuit people (Bray &Velazquez, 2009; Chicchon, 2009, Comberti et al., 2015) • 'Dangerous nature' may be allowed to flourish (predators) leading to human-wildlife conflicts. Or disastrous wildlife consequences of human withdrawal, i.e., rewilding carried out badly (Albrecht, et al., 2013; Redpath et al., 2013) • Misanthropy, e.g., in calls for forced human population control (Gerber, 2002)	• Using nature for territorial identities (to the exclusion and oppression of others). E.g., not 'from' here (Lubarda, 2020) • Creation of colonial landscapes and suppression of alternatives (conflicts about whose landscape should be restored or maintained) (Astuti,& McGregor, 2017) • unsustainable attachment to landscapes and maladaptation (DeSilvey and Harrison, 2020e; Hicks, 2011) • static conceptualisations of place attachment and meanings leading to resistance of renewable energy, among other, developments that support sustainability goals (DeSilvey and Harrison, 2020).	• Idealisation, and obscuration of natural resource needs (Raymond, 2007) • Nature not recognised in its own right; hubristic approach to managing/dominating/ controlling nature. Cf. Idea of 'Post-environmentalism'/ Eco-modernism nature does not exist because we (social/technological beings) *are* nature. Leading to hubristic management approaches, e.g., geo-engineering etc (Albrecht et al., 2013; Štante, 2010).
Risk of-under emphasis	• Reduction in food security and reliance on imports (Gomiero, 2016; Fazey et al. 2011) • Exporting / externalisation of environmental impacts (Fuchs et al., 2020) • Lack of infrastructure for human/social development (Clover, 2003)	• Reduced resilience and increase in pests, diseases, and natural disasters resulting from loss of biodiversity and habitats (Fleming et al., 2017) • Coping with environmental disaster & dangerous 'nature' (predators, pests, …) becomes much more difficult (Albrecht et al., 2013) • Elimination of organisms, landscapes, ecosystems, that	• Under-recognition of cultural identities and relationships with land, leading to socially unjust outcomes of land management decisions. (Anguelovski, et al., 2018; Comberti et al., 2015) • Displacement (like in settlers' colonialism) (Anguelovski et al., 2018; Comberti et al., 2015) • Lack of biocultural and cultural	• Increasing disconnection from nature and loss of eco-literacy (e.g., through urbanisation and loss of green spaces) risks human well-being and sustainability (Cumming, 2016). • Disregard for alternative worldviews and knowledge systems (Jackson & Barber, 2013) • Disregard for indigenous communities' rights to and relationships

		threaten development, growth or human settlements - for example wetlands (Adekola and Mitchell, 2011; Fisher, 2010) or tigers • Monocultures lead to mass biodiversity loss/species extinction (Liu et al., 2018) • Exacerbation of climate change (Dinerstein et al., 2019; Ripple et al., 2019)	diversity (Caillon et al., 2017) • Creation of physical spaces devoid of positive place meanings (Church et al. 2014) • Risk of public backlash against decisions that are seen to exclude local values (Kenter et al. 2014, 2015)	with land (e.g., resource exploitation destroying traditional land-based communities) (Adekola and Mitchell, 2011; Chicchon 2009; Jackson & Barber, 2013) • Identifying certain groups of people as 'close to nature' (as historically women or non-white Europeans) as a way to exclude them from rights and political entitlements • Over-objectification and abstraction of nature separate from people leading to overly technocratic approaches to valuation and decision-making based solely on optimisation and efficiency (Cumming, 2016; Linton, 2010)

Balancing nature's values through the life framework

Explicit recognition of multiple values and knowledges in valuation and policy enhances procedural justice and improves the quality of democratic decisions (Tengö, 2014; DeVente et al. 2016). This recognition acknowledges that there is no single, or universal, balance that might be advocated in terms of balancing the risks associated with the life frames. In order to exemplify this, it is worth exploring some further context-specific examples to applying the life framework to a risk management context.

For example, in their study of the Niger Delta wetlands, Adekola and Mitchell (2011) describe ecosystem disservices, particularly flooding, arising from the exploitation of natural resources such as oil in the area that has changed the structure of the wetlands.

'The changes in the wetland have also resulted in communities being exposed to natural hazards (Olajire et al. 2005; Omeje 2006). There have been recent reports of unprecedented flooding in the delta, inundating thousands of homes and businesses, and forcing families to relocate (Oyadongha 2009)' (Adekola & Mitchell, 2011, pg. 59).

In terms of life frames, emphasis on exploitation of natural resources (*living from*) has generated an exacerbation of risks of ecosystem disservices (negative NCP). These arise as a result of the lack of representation of *living with* the wetland systems; greater acknowledgement of the wetland's natural processes would have allowed greater recognition of their fundamental values. The overemphasis on

resource exploitation has also been paired with an under-recognition of NCP and values associated with *living in* the wetlands as place.

According to Opukri and Ibaba (2008), there are strong links between oil-based environmental degradation and displacements in the Niger Delta. A local commentator noted that sacred shrines and places of worship have been opened up for drilling and exploration for oil, and ancient landmarks pulled down and in some cases destroyed: 'We are now like a people without a past' (Bisina 2006). This illustrates a significant loss of cultural value to local communities. (Adekola, Mitchell, 2011, pg. 59-60).

Importantly, conflicts may not just take place between frames, but also within. In the Niger Delta case, due to a lack of recognition of the fundamental values that sustain NCP, *living from* the exploitation of wetland oil production has displaced *living from* the wetlands in other ways:

Moreover, employment and job opportunities (as fishermen, farmers, hunters, ferry men, etc.) have declined, and intense poverty is becoming entrenched (Aluko 2004)' (Adekola & Mitchell, 2011, pg. 59-60).

While the implications in terms of the *living as* frame are not explicitly revealed, the dynamics shown here do highlight a disregard for the fundamental recognition that humans are not separate from the natural world but interdependent and embedded within it.

The over- and under-representation of different frames in this example can be related to different forms of justice: distributive justice (bother intra- and intergenerational) in terms of the distribution of benefits and costs of *living from* different natural resources; recognition justice in terms of the privileging of the view of the wetlands as an exploitable resource, with broader frames being disregarded; procedural justice, with local people unable to effectively be involved in making balanced decisions about them; and epistemic justice in terms of disregard for local place-based knowledge and values such as relating to cultural landscape values. The life framework can thus service as a policy vehicle to address conflicts and seeking balance between frames.

However, a further concern, as expressed previously in relation to the *living as* frame, is that increasing disconnection has been observed, which may lead to underrepresentation of all four frames, and a general disregard for nature's values. Lack of interest or care towards nature may result from a lack of information, understanding or direct connection to the natural world (Aronson et al., 2010). However, while this may be put down to a lack of cultural or social recognition and understanding of the role nature plays in terms of its contributions to people, the way that valuations are framed also actively shape the values that people take note of and understand. In relation to empirical work on marine values in the UK, the framing of valuations influence the resulting life frames and associated values elicited. By broadening the framings of valuations in policy and research, a broader set of values may be elicited. This is not just important in relation to inclusion of values in decisions, but also because the 'approachability' of different values differs; e.g., Chan et al. (2016) argue that less abstract, more place-based and relational values can highlight new avenues for public engagement with nature and support for sustainability. Broader framings of nature in the classroom have also been noted as important to instil a reconnection with nature (Barker, 2007). This is also important in terms of opening to different epistemic worldviews. Disconnection can be explained through the various ontologies and associated methodologies and approaches that are utilised to assess value. A dualistic worldview that sees nature as mechanistic, passive and inanimate underpins the narrower *living from* perspectives where nature is primarily seen as a resource for exploitation. This can lead to disconnection. For example, in Du Bray et al.'s (2019) study of local cultural valuations of rivers, they often did not relate these to the ecosystem services framework because people felt the river in question was 'dead' or incapable of providing any services at all, epitomising what could be characterised as living despite nature. Other authors have highlighted the

prominence of consumerist, materialistic values in social institutions, and suggest that these institutions, such as the prominence of economic growth as a policy goal and the strong emphasis on consumerism in driving economic growth, need to change to allow for broad value change towards more *sustainability-aligned values* (Kasser, 2016).

In conclusion, applying the life framework to assess the risks and associated justice aspects that may be attached to certain conservation and environmental management approaches, provides a vehicle for shifting framing away from a predominant *living from* focus towards inclusion of multiple frames can support new pathways for sustainability transformations (IPBES, 2019). For example, when framing of EU agri-environmental payment schemes was repositioned towards a stronger *living with* framing, this gradually shifted self-identities of participating farmers from producers to stewards of the countryside (Davies and Hodge, 2012). Systematic consideration of the LF enables a transparent approach to include different sets of values and supports capacities for transformation by providing policy-makers with alternatives to combine and relate the diversity of values to sustainable futures (Harmáčkova et al. 2021). It can also act as a communication tool for environmental agencies to integrate different pathways to nature-human relations across government sectors.

The life framework and the IPBES conceptual framework

Above, we have discussed the relation between the life framework and NCP framework generally, and between particular life frames and NCP. Here we will consider in more detail the relation between the life framework and the IPBES general framework, which describes the relationships between Nature, NCP, Good quality of life, Direct drivers of change in nature, Institutions, governance, and other indirect drivers of change, and anthropogenic assets (Figure SM2.24; Diaz et al. 2015). This discussion serves to explain the values conceptualisation of the *values assessment Chapter 2* in relation to the established concepts in the framework (Diaz et al. 2015, 2018; Pascual et al. 2017), with a particular focus on the life frames, building on the overall perspective presented in *2.6*.

In the IPBES conceptual framework figure, intrinsic values are deemed to be associated directly with nature whilst instrumental and relational values are implicit in NCP, and also represented by arrow 8, which represents the value of NCP to good quality of life. *Chapter 2* has presented updated core definitions of intrinsic, instrumental and relational values.

Figure SM2.24 presents the key value related concepts presented in *Chapter 2*, including worldviews, broad and specific values (instrumental, intrinsic, relational and fundamental), and value indicators and preferences (sociocultural, biophysical and economics), whilst the diverse and dynamic nature of values is represented in the vertical and horizontal large orange arrows.

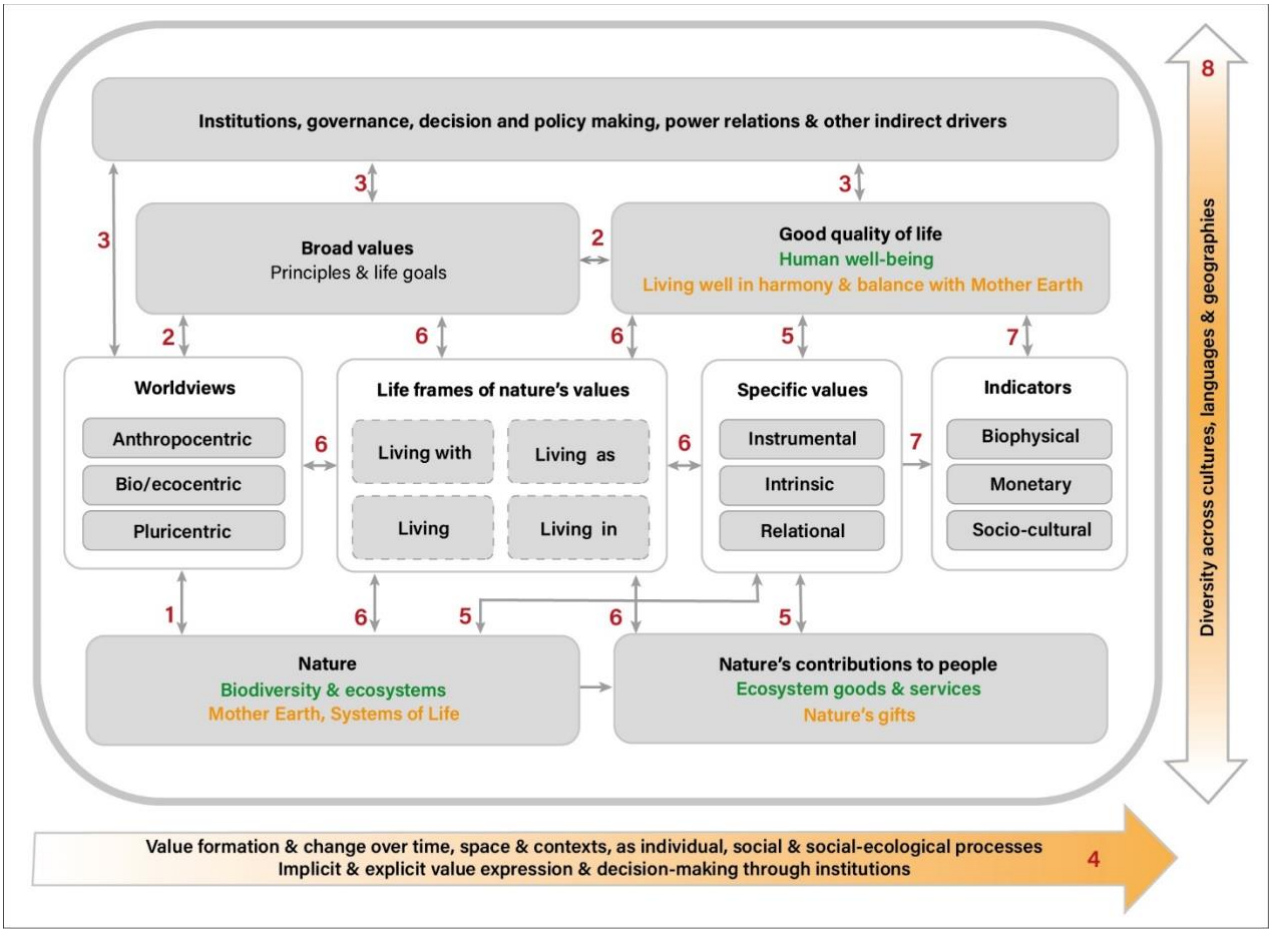

Figure SM2.24 Relations between the life frames and key IPBES concepts.

Key elements of *Figure SM2.24*

"Worldviews" are general beliefs about the world and our relationship to it. *Chapter 2* considered epistemic worldviews, which denotes key assumptions about the world by different scientific and indigenous and local knowledge approaches, and worldviews of human-nature relations, including weak and strong anthropocentric, biocentric, ecocentric and pluricentric perspectives.

"Broad values" are life goals and guiding principles that are shaped by our cultures and worldviews. They characterise desirable relationships between people and nature, including with regard to good quality of life. Broad values go beyond particular contexts, although they originate in and arise from specific cultural settings, languages, and geographies (vertical orange arrow). Broad values can be considered at the individual level, or as **shared values** (communal, societal and cultural values).

"Specific values" are opinions or judgements of the importance of specific things in particular situations and contexts. According to the literature, there are three types of specific values: **instrumental**, **relational** and **intrinsic** values. While these three types of specific values denote distinct meanings, they are not mutually exclusive. For example, a bird can be important as a source of food (instrumental), as kin (relational), and for its own sake independent of its use or relation to people (intrinsic). Specific values can be considered at the individual level or at the social level (social values). Social values can be understood by aggregating individual values, or formed through deliberative social processes (shared social values). Instrumental, relational and intrinsic values can be distinguished from each other in the following way. Relational and instrumental values are both anthropocentric, while intrinsic values are non-anthropocentric. Instrumental values are substitutable, whilst intrinsic and relational values are both non-substitutable. *Chapter 2* also discusses **life support values**, which refers to the importance of nature in terms of life support functions and ecological

processes that support other values. Life support values can have intrinsic, instrumental and relational aspects.

"Value indicators" are the quantitative measures (including monetary measures) and qualitative indicators of such judgements or opinions. This category includes the IPBES (2015) category of 'measures' and is the most common understanding of the word values in economics and statistics. Value indicators are associated with valuation methods. They also include preference-based indicators, such as willingness to pay. The literature defines three main categories of value indicators: **economic value indicators**, **sociocultural value indicators** and **biophysical value indicators**. Important groups of indicators include **health** and **indigenous and local knowledge value indicators**, which can both also be termed in sociocultural, biophysical and economic terms.

1. **"Preferences"**, which can be expressed in economic or sociocultural terms, denote a stated or revealed choice of one alternative over others. They but provide rankings of possible outcomes in terms of their specific value to people.
2. **"Life frames of nature's values"** express the four basic ways how people (individually and collectively) frame the ways in which nature matters. Life frames mediate between ways that people relate to nature, to why nature is important. Life frames are not mutually exclusive overarching worldviews. Rather, they can be seen as different sources of concern for the natural world.
3. **"Cultures, languages and geographies"** (vertical orange arrow) affect all elements of the diagram, including the way that nature and its contributions and good quality of life are conceived of, the degree to which different life frames are important, the way that broad and specific values are conceptualised. The framework illustrated here provides a **generalised perspective** that can provide an overarching context for assessment at the scales within IPBES' scope. However, values, like NCP, can also be considered within a **context-specific perspective** that accommodates diverse conceptualisations as well as embodied experience (Diaz et al. 2018).
4. The orange horizontal arrow expresses **change over time** in the status and trends of values, including values formation and expression, as well as across institutional setups. While specific values are considered to be more malleable than broad values and life frames, overall values change is more likely at particular life stages of individuals (e.g., childhood), as part of targeted social valuation processes (e.g., group deliberation) or due to major social-ecological regime shifts. Institutional modifications can change what values get expressed, but also can feedback the formation of values themselves.

Interlinkages between life frames and other elements and their interrelations with the IPBES conceptual framework.

The life frames tie together nature and NCP and their specific values, with worldviews, broad values good quality of life (arrows 6). The life frames represent four key ways in which people view human-nature relations and how nature matters. These distinct ways of looking at nature organize different sets of interrelated worldviews, broad and specific values, value indicators and NCP in terms of the interrelations between nature and good quality of life. In other words, different worldviews, broad and specific values, and what NCP and other aspects of nature are emphasized or prioritised, are not independent of each other, and can be summarised and organized through the four life frames. These sets of values also interact with institutions and governance in different ways. This will be further considered below.

Worldviews, broad values and good quality of life are closely associated (arrows 2). Broad values are anchored into individual and collective worldviews of human nature relationships, and epistemic worldviews also inform what broad values are prioritised. In other words, broad values form the normative and teleological cornerstones of people's perspectives on nature. Worldviews and broad

values shape how people conceive of good quality of life. For example, this is expressed in the broad values 'harmony' and 'balance' in the blue-lettered example interpretation of good quality of life in the IPBES conceptual framework. Other examples of broad values that have been directly associated by IPBES to conceive of good quality of life include health, security, equity and freedom of choice and action.

Worldviews and broad values also shape and are shaped by institutions, governance and indirect drivers (arrows 3), including formal and informal interactions within social structures and diverse norms and rules. For example, different understandings of fairness, equity and responsibility will shape different systems of property rights, economic policy, legislative arrangements and informal social norms and rules, which play a significant influence in how people act in relation to nature. Thus, through institutions, broad values shape direct anthropogenic drivers affecting nature. The change in institutions over time corresponds with changes in and formation of broad values over time (horizontal orange arrow) through a dynamic relationship. As such, institutional 'lock-in' can hold back broad values from changing, or conversely tipping points in changes in broad values may be needed for institutions to change or new institutions with regard to the conservation and sustainable use of nature to form (*2.5*).

The **life frames are tied with different subsets of broad values (arrow 6)**, including with regard to good quality of life, but also in terms of how nature is framed as important more broadly. ***Living from*** emphasizes prosperity, livelihood security, efficiency, human welfare, and in terms of justice emphasizes intragenerational and intergenerational justice. ***Living with*** can be linked with responsibility as respectful cohabitation, coexistence, care (supporting regeneration, reducing harm, mutuality, sharing), protecting the environment, stewardship, rights of nature, and inter- and multispecies justice. ***Living in*** is most typically related to belonging, tradition, place-based meaning, enjoyment, beauty and aesthetics, inspiration, mental and physical health and restoration, care, heritage, rootedness and bio-cultural diversity. ***Living as*** often reflects oneness, care, reciprocity, connectedness, harmony with nature, reciprocal responsibilities, sharing, sovereignty, respect, responsibility for the land, kinship with non-human persons, self-determination, and self-realisation (realising an ecological identity) (*2.3.2*, and section **The life frames in the environmental values literature** in this annex).

The life frames associate with different sets of specific values (arrow 5). ***Living from*** puts emphasis on instrumental values (monetary and non-monetary), also reference to fundamental values of processes that support human existence and prosperity as well as to some eudaemonic relational values (sustaining nature because of a happy and flourishing human life). ***Living with*** emphasizes intrinsic values (inherent worth, dignity of nonhuman beings), life support values, values of processes that support the existence and flourishing of nonhuman beings, and some eudaemonic relational values (sustaining nature because of a responsible, virtuous and fulfilled human life, stewardship). ***Living in*** emphasizes eudaimonic relational values (a meaningful, healthy, place-based and non-alienated human life) and constitutive relational values (essential components of human identity, practices, and cultural meanings). ***Living as*** puts emphasis on constitutive relational values (relations that constitute who people and communities of human and nonhuman beings *are*) and eudaimonic relational values (a good life in harmony with nature-as-self, a self-realised life) (*2.3.2* and section **The life frames in the environmental values literature** in this annex).

The relative importance of different life frames influences the relative importance of and attention to different NCP (arrow 6). *Living from* emphasizes material and regulatory NCPs, such as soil formation, Pollination, habitats, food & feed, energy, freshwater, medicinal/genetic resources, labour, and maintenance of options. *Living in* emphasizes non-material and context-specific NCP, such as physical and psychological experiences, learning and inspiration, identities, water quality, habitats. *Living with* and *Living as* are less closely associated with NCP, because they more strongly emphasize intrinsic values, two-way relationships of care and responsibility (*Living with* and as) and

a non-dualistic way of understanding nature (*Living as*); thus their relationships with NCP are indicated by dotted lines. *Living with* can however be associated with positive and negative regulating contributions, including habitats, air quality regulation, climate, ocean acid regulation, hazard regulation, maintenance of options (*2.3.2* and section **The life frames in the environmental values literature** in this annex).

While the above provides an overall view of the interrelations between the life frames, nature, NCP and good quality of life, it is also possible to consider the IPBES framework as a whole through the lens of each of the different life frames (*Figure SM2.25*). In *living from* (B), the focus is on nature as a source of NCP with a view that, as discussed in subsection **Living from** from section **The life frames in the environmental values literature** above, is congruent with most applications of the ecosystem services framework. The focus is anthropocentric and on instrumental and relational values. *Living with* (B) places people next to nature, with an emphasis on the direct relationship between nature and good quality of life, and also regulating NCP. There is a focus on intrinsic values but some relational and instrumental values can also come into play (subsection **Living with** from section **The life frames in the environmental values literature** above). In *living in* (C), people are still at the center, but the relation with nature is closer as place, land or landscape that provides NCP, with a focus on relational and to a lesser degree instrumental values (subsection **Living in** from section **The life frames in the environmental values literature** above). *Living as* (D) collapses the IPBES concepts of nature, NCP and good quality of life; the conception of a nature separate from people that provides a flow of benefits does not make sense from this frame, with the emphasis on reciprocal relations with a predisposition towards a more pluricentric worldview (subsection **Living as** from section **The life frames in the environmental values literature** above).

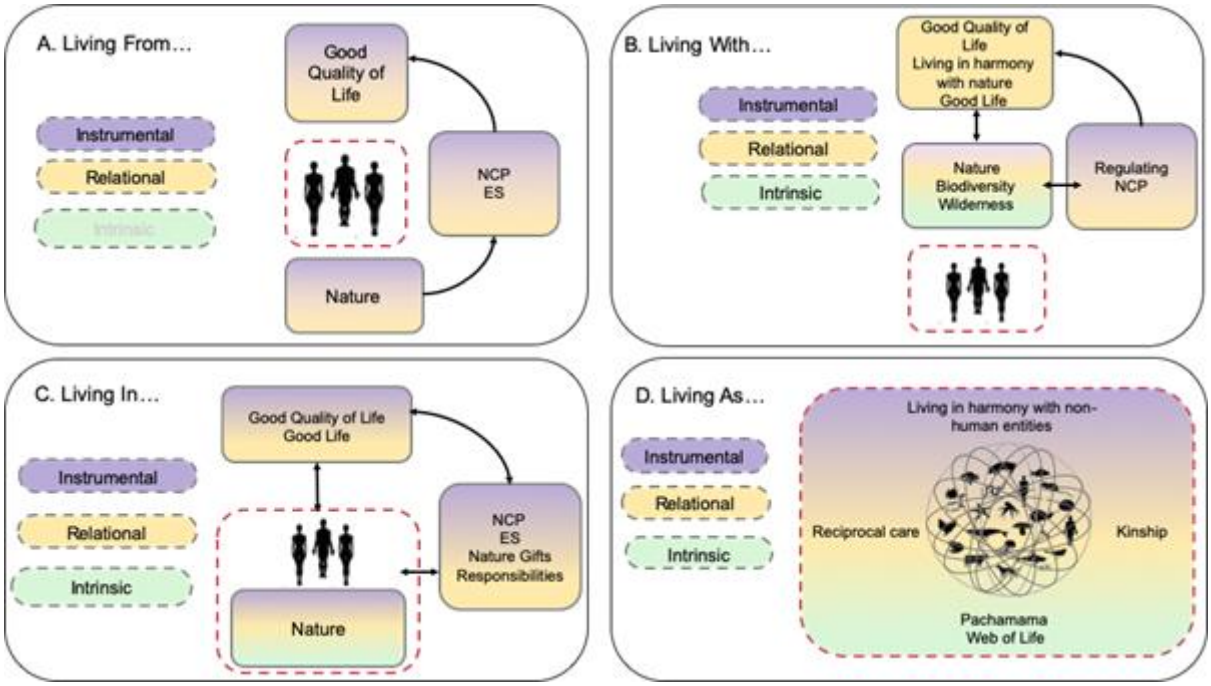

Figure 2.25 Perspectives on the IPBES general framework from the view of each of the life frames.

The life framework and the Nature Futures Framework

The Nature Futures Framework (NFF) was developed by the IPBES expert group (2016 - 2019) and task force (2019 - present) on scenarios and models to catalyze the development of new scenarios to better inform policy-making for nature and nature's contributions to people. It built on the IPBES Methodological Assessment of Scenarios and Models (IPBES, 2016). It is a heuristic tool for scenario

development with a view towards the kind of transformative change outlined by the IPBES (2019) global assessment, IPCC (2018), and others, which requires identifying visions of sustainable futures and pathways towards achieving those visions (Balvanera et al. 2017; Pereira et al. 2020).

NFF outlines three archetypal desirable futures for nature (Pereira et al. 2020):

- *Nature for Nature*, where people view nature as harbouring intrinsic value, and value is placed on the diversity of species, habitats, ecosystems, and processes that form the natural world, and nature's ability to function autonomously;
- *Nature as Culture* highlights relational values for nature, where societies, cultures, traditions and faiths are intertwined with nature in shaping cultural landscapes.
- *Nature for Society* highlights the benefits and instrumental values that nature provides to people and societies.

While each of the archetypal futures is primarily associated with one of the three types of specific values, the futures overlap and thus allow for inclusion of the other value types. The relation between the futures is conceived both as a Venn shape to highlight these overlaps, and as a triangle. The triangle represents a possible futures space that consists of continuums or gradients between the three futures, i.e., a positive future for nature may lie somewhere on the triangle. As such, all locations within the triangle can be related to each of the three specific values and offer some combination of all three. These 'desirable' futures may be place- or context-specific, subject to local cultures and values. The NFF does not prejudge any particular scenarios as preferred.

The NFF was developed through an iterative process with members of the scenarios and models expert group and stakeholders. They first broadly considered a range of values and NCP within seven visions (food production, marine, nature's dynamics, culture, prosperity, water, and urban rural flows). These were then related to the three types of specific values to identify the final three futures. The specific aim of this was to make the three IPBES value types actionable for the modelling and scenarios community. Pereira et al. (2020) present a detailed overview of this process.

The NFF was developed through an iterative process with members of the scenarios and models expert group and stakeholders. They first broadly considered a range of values and NCP within seven thematic visions (food production, marine, nature's dynamics, culture, prosperity, water, and urban rural flows). These were then related to the three types of specific values to identify the final three futures. These visions were then mapped across different dimensions of how nature is valued, managed or utilized, how much space is allocated to nature, and the degree of connectedness between people and nature. Through this dimensional mapping exercise, the three archetypal futures emerged, forming the three corners of the Nature Futures Framework. Pereira et al. (2020) present a detailed overview of this process. The specific objective of these exercises was to develop a new scenarios framework that responded to the limitations of current scenarios as detailed in the 2016 Methodological Assessment of scenarios and models (IPBES, 2016).

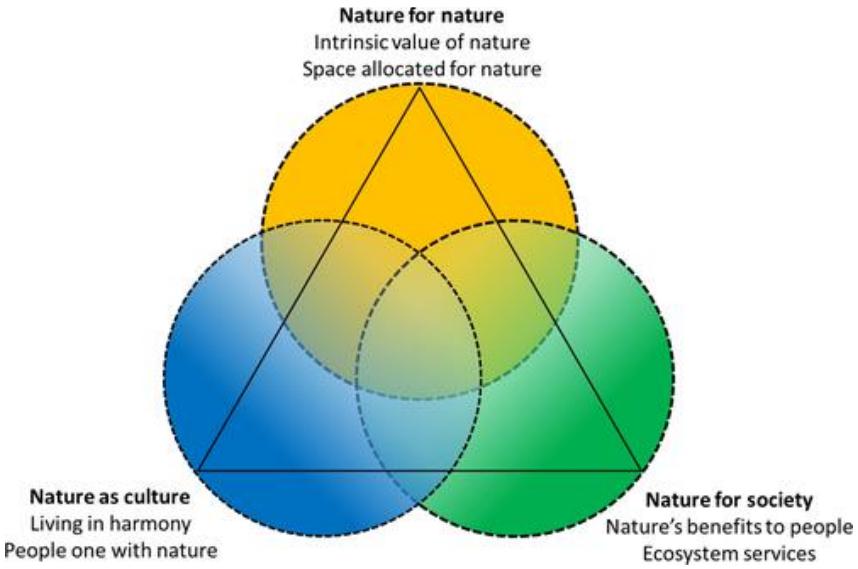

Figure 2.26 The Natures Futures Framework (Source: PBL, 2018).

Differences between the life framework and Nature Futures Framework

There are thus a number of differences between the NFF and the life framework. In terms of origins and development, the life framework was not primarily developed through expert deliberation but from the broad environmental values literature, initially by O'Connor and Kenter (2019) and Kenter and O'Connor (2022), building on O'Neill et al. (2008), and then by the *Chapter 2* team through extensive systematic review, as described above, providing substantial depth and nuance to the frames, as detailed in section The life frames in the environmental values literature above. The NFF was designed based on reframing and mapping of a diversity of positive future visions for nature across many dimensions that affect how nature is valued, managed, and utilized. Within the deliberative process, came to realize these could be underpinned by the three broadly applicable archetypal perspectives that were congruent with the three IPBES specific value types (instrumental, intrinsic, relational). In contrast, the life framework is a separate conceptual construct distinct from the instrumental-intrinsic-relational values trifecta, but was related to the trifecta and broad values, NCP, worldviews and other categories based on the interdisciplinary environmental values literature without a particular predefined purpose like scenario development.

In terms of purpose, both frameworks seek to provide a straightforward, easy to understand heuristic for working with plural values of nature. However, the NFF was developed for the purpose of scenario development, i.e., for working with experts and stakeholders to identify desirable futures and pathways to their realisation. The life framework was developed for a broader set of purposes, including organizing, communicating, assessing, deliberating, bridging, prioritising and transforming values, and designing valuations (Kenter & O'Connor, 2022).

The NFF is fundamentally normative in that it aims to catalyze the development of desirable futures that focus on achieving a world that realizes the Convention on Biological Diversity's 2050 Vision for Biodiversity of 'Living in Harmony with Nature' (CBD, 2010), while considering the 2030 Agenda and its Sustainable Development Goals; these visions and goals require reversing declines in biodiversity and nature's contributions to people (Pereira et al., 2020). As discussed in detail above, the life framework considers both positive and negative values, highlighting both sustainability aligned values associated with the different frames (section The life frames in the environmental values literature) and risks and concerns of overemphasizing particular frames (section Seeking balance: life frames, risks and policy). As such, the life framework presents decision makers with a

descriptive rather than normative framework that can be used to bridge and balance positive and negative values.

In terms of value organization, the NFF provides a simple heuristic where the three archetypal futures are mapped one-to-one on the IPBES trifecta or instrumental, relational and intrinsic values and by which users develop scenarios that represent a diversity of futures based on these values. In contrast, the life framework, as developed above, starts by defining a particular frame of relationship with nature, and then associates these frames with a multi-layered perspective on values, where instrumental, relational and intrinsic values are emphasized to different degrees and in different ways.

In terms of value concepts, the NFF focuses on specific values and considers broad values implicitly, whereas the life framework makes broad values more explicit.

In terms of worldviews, the life framework is also more explicit, both in terms of degrees of anthropocentrism and the ontological dimension of dualism vs holism (section The life frames in the environmental values literature). These considerations are an explicit reason why the living as nature frame was added and differentiated from the living with and in nature frames. The Nature as Culture future has similarities with both the living in and living as nature frames, and as a result implicitly reflects a very broad ontological field. Explicit differentiation between the living in and as frames enables more explicit recognition of more holistic and relational worldviews.

Finally, in terms of visual representation, the NFF is conceived of as a triangle space, which visually represents the corners as the three contrasting archetypal futures, between which the different possible futures can fall. The life framework is presented in a circular concept, which as a visual facilitation tool may emphasize points of linkage and overlap between stakeholders' values (Harmáčkova et al., 2021).

Using the life framework and Nature Futures Framework in conjunction

While the life framework can be used independently for scenario planning (Harmáčkova et al., 2021), it can also benefit applications of the NFF by introducing its broader ontological depth, making different human-nature relations and worldviews more explicit, and also considering broad values, risks and concerns, and negative values more explicitly. For example, the life framework could be used to make present values more explicit and consider the risks, justice and sustainability considerations of current framings. The NFF could then help users develop scenarios within a range of socio-cultural, economic, and political contexts and across a wide range of spatial scales, which may identify pathways towards desirable futures for nature. Within each of these futures, the relative emphasis on different life frames and associated values and worldviews could then be made explicit to add nuance and again consider risks and concerns and both positive and negative values more explicitly. This could then help to inform desirable pathways and scenario evaluation within the futures space.

References

Aa, B., Groote, P., & Huigen, P. (2010). World heritage as NIMBY? The case of the Dutch part of the Wadden Sea. Current Issues in Tourism, October 1, 291–302. https://doi.org/10.1080/13683500408667986

Abensperg-Traun, M. (2009). CITES, sustainable use of wild species and incentive-driven conservation in developing countries, with an emphasis on southern Africa. Biological Conservation, 142(5), 948–963. https://doi.org/10.1016/j.biocon.2008.12.034

Adam, M. C., & Kneeshaw, D. (2008). Local level criteria and indicator frameworks: A tool used to assess aboriginal forest ecosystem values. Forest Ecology and Management, 255(7), 2024–2037. https://doi.org/10.1016/j.foreco.2007.12.051

Adamowicz, W. L., & Olewiler, N. (2016). Helping Markets Get Prices Right: Natural Capital, Ecosystem Services, and Sustainability. Canadian Public Policy, 42(S1), S32–S38. https://doi.org/10.3138/cpp.2015-021

Adekola, O., & Mitchell, G. (2011). The Niger Delta wetlands: Threats to ecosystem services, their importance to dependent communities and possible management measures. International Journal of Biodiversity Science, Ecosystem Services and Management, 7(1), 50–68. https://doi.org/10.1080/21513732.2011.603138

Aggestam, F. (2015). Framing the ecosystem concept through a longitudinal study of developments in science and policy. Conservation Biology, 29(4), 1052–1064. https://doi.org/10.1111/cobi.12516

Ainsworth, G. B., Kenter, J. O., O'Connor, S., Daunt, F., & Young, J. C. (2019). A fulfilled human life: Eliciting sense of place and cultural identity in two UK marine environments through the Community Voice Method. Ecosystem Services, 39, 100992. https://doi.org/10.1016/j.ecoser.2019.100992

Akida, A. and Blomley, R. (2006) Trends in Forest Ownership, Forest Resources Tenure and Institutional Arrangements: Are They Contributing to Better Forest Management and Poverty Reduction? Case Study from the United Republic of Tanzania; FAO: Dar es Salaam, Tanzania, pp. 1–26.

Albrecht, G. A., Brooke, C., Bennett, D. H., & Garnett, S. T. (2013). The Ethics of Assisted Colonization in the Age of Anthropogenic Climate Change. Journal of Agricultural and Environmental Ethics, 26(4), 827–845. https://doi.org/10.1007/s10806-012-9411-1

Aldred, J. (2006). Incommensurability and monetary valuation. Land Economics, 82(2), 141.

Allen, C. R., Birge, H. E., Angeler, D. G., Arnold, C. A. (Tony), Chaffin, B. C., DeCaro, D. A., Garmestani, A. S., & Gunderson, L. (2018). Quantifying uncertainty and trade-offs in resilience assessments. Ecology and Society, 23(1), art3. https://doi.org/10.5751/ES-09920-230103

Anguelovski, I., Connolly, J., & Brand, A. L. (2018). From landscapes of utopia to the margins of the green urban life: For whom is the new green city? City, 22(3), 417–436. https://doi.org/10.1080/13604813.2018.1473126

Apostolopoulou, E., & Adams, W. M. (2017). Biodiversity offsetting and conservation: Reframing nature to save it. ORYX, 51(1), 23–31. https://doi.org/10.1017/S0030605315000782

Arkema, K. K., Griffin, R., Maldonado, S., Silver, J., Suckale, J., & Guerry, A. D. (2017). Linking social, ecological, and physical science to advance natural and nature-based protection for coastal communities. Annals of the New York Academy of Sciences, 1399(1), 5–26. https://doi.org/10.1111/nyas.13322

Arlinghaus, R. (2006). Overcoming human obstacles to conservation of recreational fishery resources, with emphasis on central Europe. Environmental Conservation, 33(1), 46–59. https://doi.org/10.1017/S0376892906002700

Aronson, J., Blignaut, J. N., De Groot, R. S., Clewell, A., Lowry, P. P., Woodworth, P., Cowling, R. M., Renison, D., Farley, J., Fontaine, C., Tongway, D., Levy, S., Milton, S. J., Rangel, O., Debrincat, B., & Birkinshaw, C. (2010). The road to sustainability must bridge three

great divides. Annals of the New York Academy of Sciences, 1185, 225–236. https://doi.org/10.1111/j.1749-6632.2009.05281.x
Astuti, R., & McGregor, A. (2017). Indigenous land claims or green grabs? Inclusions and exclusions within forest carbon politics in Indonesia. The Journal of Peasant Studies, 44(2), 445–466. https://doi.org/10.1080/03066150.2016.1197908
Ateljevic, I. (2013). Transmodernity: Integrating perspectives on societal evolution. Futures, 47, 38–48. https://doi.org/10.1016/j.futures.2013.01.002
Azzopardi, E., Kenter, J.O., Young, J., Leakey, C., O'Connor, S., Martino, S., Flannery, W., Sousas, L.P., Mylona, D., Frangoudes, K., Beguier, I., Pafia, M., Rey da Silva, A., Koutrakis, M., Ainscough, J. (2021). What are heritage values? Integrating natural and cultural heritage into environmental valuation. In press.
Baek, J. (2013). fūdo: An East Asian Notion of Climate and Sustainability. Buildings, 3(3), 588–597. https://doi.org/10.3390/buildings3030588
Bark, R. H., Martin-Ortega, J., & Waylen, K. A. (2021). Stakeholders' views on natural flood management: Implications for the nature-based solutions paradigm shift? Environmental Science & Policy, 115, 91–98. https://doi.org/10.1016/j.envsci.2020.10.018
Barker, S. (2007). Reconnecting with nature; learning from the media. Journal of Biological Education, 41(4), 147–149. https://doi.org/10.1080/00219266.2007.9656089
Baveye, P. C., Baveye, J., & Gowdy, J. (2016). Soil "Ecosystem" Services and Natural Capital: Critical Appraisal of Research on Uncertain Ground. Frontiers in Environmental Science, 4(June), 1–49. https://doi.org/10.3389/fenvs.2016.00041
Beau, R. (2015). From wilderness to ordinary nature: A French view on an American debate. Environmental Ethics, 37(4), 425–443. https://doi.org/10.5840/enviroethics201537441
Benyus, J. M. (2002). Biomimicry: Innovation Inspired by Nature.
Bernard, H. (2000) Social Research Methods: Qualitative and Quantitative Approaches. Thousand Oaks, London
Bhagwat, S. A., Nogué, S., & Willis, K. J. (2014). Cultural drivers of reforestation in tropical forest groves of the Western Ghats of India. Forest Ecology and Management, 329, 393–400.
Boyd, J., Ringold, P., Krupnick, A., Johnston, R. J., Weber, M. A., & Hall, K. (2016). Ecosystem services indicators: Improving the linkage between biophysical and economic analyses. International Review of Environmental and Resource Economics, 8(3–4), 359–443. https://doi.org/10.1561/101.00000073
Braat, L. C. (2018). Five reasons why the Science publication "Assessing nature's contributions to people" (Diaz et al. 2018) would not have been accepted in Ecosystem Services. Ecosystem Services, 30, A1–A2. https://doi.org/10.1016/j.ecoser.2018.02.002
Bratton, S. (2018). Eco-Dimensionality as a Religious Foundation for Sustainability. Sustainability, 10(4), 1021. https://doi.org/10.3390/su10041021
Bray, D. B., & Velazquez, A. (2009). From Displacement-based Conservation to Place-based Conservation. Conservation and Society, 7(1), 11. https://doi.org/10.4103/0972-4923.54791
Bray, M. V. du, Stotts, R., Beresford, M., Wutich, A., & Brewis, A. (2019). Does ecosystem services valuation reflect local cultural valuations? Comparative analysis of resident perspectives in four major urban river ecosystems. Economic Anthropology, 6(1), 21–33. https://doi.org/10.1002/sea2.12128
Brear, M., Kudo, S., Hansen, M., & Allasiw, D. (2019). Beyond deliberation: A cross-cultural comparison of how needs influence lived social values for sustainability. Sustainability Science.
Bremer, L. L., Mandle, L., Trauernicht, C., Pascua, P., McMillen, H. L., Burnett, K., Wada, C. A., Kurashima, N., Quazi, S. A., Giambelluca, T., Chock, P., & Ticktin, T. (2018). Bringing multiple values to the table: Assessing future land-use and climate change in North Kona, Hawaiʻi. Ecology and Society, 23(1), art33. https://doi.org/10.5751/ES-09936-230133

Bremer, L., Falinski, K., Ching, C., Wada, C., Burnett, K., Kukea-Shultz, K., Reppun, N., Chun, G., Oleson, K., Ticktin, T. (2018). Biocultural Restoration of Traditional Agriculture: Cultural, Environmental, and Economic Outcomes of Loʻi Kalo Restoration in Heʻeia, Oʻahu. Sustainability 10, 4502. https://doi.org/10.3390/su10124502w

Bretzel, F., Vannucchi, F., Romano, D., Malorgio, F., Benvenuti, S., & Pezzarossa, B. (2016). Wildflowers: From conserving biodiversity to urban greening—A review. Urban Forestry and Urban Greening, 20, 428–436. https://doi.org/10.1016/j.ufug.2016.10.008

Breure, A. M., De Deyn, G. B., Dominati, E., Eglin, T., Hedlund, K., Van Orshoven, J., & Posthuma, L. (2012). Ecosystem services: A useful concept for soil policy making! Current Opinion in Environmental Sustainability, 4(5), 578–585. https://doi.org/10.1016/j.cosust.2012.10.010

Britto dos Santos, N., & Gould, R. K. (2018). Can relational values be developed and changed? Investigating relational values in the environmental education literature. Current Opinion in Environmental Sustainability, 35, 124–131. https://doi.org/10.1016/j.cosust.2018.10.019

Brockerhoff, E. G., Barbaro, L., Castagneyrol, B., Forrester, D. I., Gardiner, B., González-Olabarria, J. R., Lyver, P. O., Meurisse, N., Oxbrough, A., Taki, H., Thompson, I. D., van der Plas, F., & Jactel, H. (2017). Forest biodiversity, ecosystem functioning and the provision of ecosystem services. Biodiversity and Conservation, 26(13), 3005–3035. https://doi.org/10.1007/s10531-017-1453-2

Brown, B., Perkins, D. D., & Brown, G. (2003). Place attachment in a revitalizing neighborhood: Individual and block levels of analysis. Journal of Environmental Psychology, 13.

Brown, T. C., Bergstrom, J. C., & Loomis, J. B. (2007). Defining, valuing, and providing ecosystem goods and services. Natural Resources Journal, 47(2), 329–376.

Bugter, R., Harrison, P., Haslett, J., & Tinch, R. (2018). Making a better case for biodiversity conservation: The BESAFE project. Biodiversity and Conservation, 27(7), 1549–1560. Scopus. https://doi.org/10.1007/s10531-018-1543-9

Buijs, A. E., Arts, B. J. M., Elands, B. H. M., & Lengkeek, J. (2011). Beyond environmental frames: The social representation and cultural resonance of nature in conflicts over a Dutch woodland. Geoforum, 42(3), 329–341.

Buller, H. (2014). Animal geographies I. Progress in Human Geography, 38(2), 308–318. https://doi.org/10.1177/0309132513479295

Buller, H. (2015). Animal geographies II: Methods. Progress in Human Geography, 39(3), 374–384. https://doi.org/10.1177/0309132514527401

Buller, H. (2016). Animal geographies III: Ethics. Progress in Human Geography, 40(3), 422–430. https://doi.org/10.1177/0309132515580489

Burchett, K. (2014). Anthropocentrism and nature. An attempt at reconciliation. Teoria, 34, 119-137.

Bürgi, M., Verburg, P. H., Kuemmerle, T., & Plieninger, T. (2017). Analyzing dynamics and values of cultural landscapes. Landscape Ecology, 32(11), 2077-2218.

Byg, A., Martin-Ortega, J., Glenk, K., & Novo, P. (2017). Conservation in the face of ambivalent public perceptions – The case of peatlands as ‘the good, the bad and the ugly.’ Biological Conservation, 206, 181–189. https://doi.org/10.1016/j.biocon.2016.12.022

Caillon, S., Cullman, G., Verschuuren, B., & Sterling, E. J. (2017). Moving beyond the human–nature dichotomy through biocultural approaches: Including ecological well-being in resilience indicators. Ecology and Society, 22(4). https://doi.org/10.5751/ES-09746-220427

Cameron, R. W. F., Blanuša, T., Taylor, J. E., Salisbury, A., Halstead, A. J., Henricot, B., & Thompson, K. (2012). The domestic garden—Its contribution to urban green infrastructure. Urban Forestry and Urban Greening, 11(2), 129–137. https://doi.org/10.1016/j.ufug.2012.01.002

Chain-Guadarrama, A., Martínez-Salinas, A., Aristizábal, N., & Ricketts, T. H. (2019). Ecosystem services by birds and bees to coffee in a changing climate: A review of coffee berry borer

control and pollination. Agriculture, Ecosystems & Environment, 280, 53–67. https://doi.org/10.1016/j.agee.2019.04.011
Chan, K. M. A., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S., Gómez-Baggethun, E., Gould, R., Hannahs, N., Jax, K., Klain, S., Luck, G. W., Martín-López, B., Muraca, B., Norton, B., Ott, K., Pascual, U., Satterfield, T., Tadaki, M., Taggart, J., & Turner, N. (2016). Opinion: Why protect nature? Rethinking values and the environment. Proceedings of the National Academy of Sciences, 113(6), 1462–1465. https://doi.org/10.1073/pnas.1525002113
Chicchon, A. (2009). Working with Indigenous Peoples to Conserve Nature: Examples from Latin America. Conservation and Society, 7(1), 15. https://doi.org/10.4103/0972-4923.54792
Choy, Y. K. (2018). Cost-benefit Analysis, Values, Wellbeing and Ethics: An Indigenous Worldview Analysis. Ecological Economics, 145(June 2017), 1–9. https://doi.org/10.1016/j.ecolecon.2017.08.005
Choy, Y.K. (2018). Cost-benefit Analysis, Values, Wellbeing and Ethics: An Indigenous Worldview Analysis. Ecological Economics 145, 1–9. https://doi.org/10.1016/j.ecolecon.2017.08.005
Chun, J. (2005). Animal welfare and nature conservation laws in Singapore: A moral duty to non-human nature? Asia Pacific Journal of Environmental Law, 9(1), 39–64.
Church, A., Fish, R., Haines-Young, R., Mourato, S., Tratalos, J., Stapleton, L., Willis, C., Coates, P., Gibbons, S., Leyshon, C., Potschin, M., Ravenscroft, N., Sanchis-Guarner, R., Winter, M., & Kenter, J. O. (2014). UK National Ecosystem Assessment Follow-on. Work package report 5: Cultural ecosystem services and indicators. UNEP-WCMC.
Clayton, S. (2003). Environmental Identity: A Conceptual and an Operational Definition. In S. Clayton & S. Opotow (Eds.), Identity and the Natural Environment (pp. 45–66). Massachusetts Institute of Technology.
CLOVER, J. (2003). FOOD SECURITY IN SUB-SAHARAN AFRICA. African Security Review, 12(1), 5–15. https://doi.org/10.1080/10246029.2003.9627566
Coates, P., Brady, E., Church, A., Cowell, B., Daniels, S., DeSilvey, C., Fish, R., Holyoak, V., Horrell, D., Mackey, S., Pite, R., Stibbe, A., & Waters, R. (2014). UK National Ecosystem Assessment Follow On. Arts and Humanities Perspectives on Cultural Ecosystem Services. UNEP-WCMC.
Colloff, M. J., Lavorel, S., van Kerkhoff, L. E., Wyborn, C. A., Fazey, I., Gorddard, R., Mace, G. M., Foden, W. B., Dunlop, M., Prentice, I. C., Crowley, J., Leadley, P., & Degeorges, P. (2017). Transforming conservation science and practice for a postnormal world. Conservation Biology: The Journal of the Society for Conservation Biology, 31(5), 1008–1017. https://doi.org/10.1111/cobi.12912
Comberti, C., Thornton, T. F., Echeverria, V. W., & Patterson, T. (2015). Ecosystem services or services to ecosystems? Valuing cultivation and reciprocal relationships between humans and ecosystems. Global Environmental Change, 34, 247–262. https://doi.org/10.1016/j.gloenvcha.2015.07.007
Cooper, N., Brady, E., Steen, H., & Bryce, R. (2016). Aesthetic and spiritual values of ecosystems: Recognising the ontological and axiological plurality of cultural ecosystem 'services.' Ecosystem Services, 21, 218–229. https://doi.org/10.1016/j.ecoser.2016.07.014
Costanza, R., de Groot, R., Braat, L., Kubiszewski, I., Fioramonti, L., Sutton, P., Farber, S., & Grasso, M. (2017). Twenty years of ecosystem services: How far have we come and how far do we still need to go? Ecosystem Services, 28, 1–16. https://doi.org/10.1016/j.ecoser.2017.09.008
Crespin, S. J., & Simonetti, J. A. (2019). Reconciling farming and wild nature: Integrating human–wildlife coexistence into the land-sharing and land-sparing framework. Ambio, 48(2), 131-138.
Cumming, G. S. (2016). The relevance and resilience of protected areas in the Anthropocene. Anthropocene, 13, 46–56. https://doi.org/10.1016/j.ancene.2016.03.003

Cunningham, S. A. (2017). Human welfare and its connection to nature: What have we learned from crop pollination studies? Austral Ecology, 42(1), 2–8. https://doi.org/10.1111/aec.12398
Czúcz, B., Arany, I., Potschin-Young, M., Bereczki, K., Kertész, M., Kiss, M., Aszalós, R., & Haines-Young, R. (2018). Where concepts meet the real world: A systematic review of ecosystem service indicators and their classification using CICES. Ecosystem Services, 29, 145–157. https://doi.org/10.1016/j.ecoser.2017.11.018
Daily, G. C., Polasky, S., Goldstein, J., Kareiva, P. M., Mooney, H. A., Pejchar, L., Ricketts, T. H., Salzman, J., & Shallenberger, R. (2009). Ecosystem services in decision making: Time to deliver. Frontiers in Ecology and the Environment, 7(1), 21–28. https://doi.org/10.1890/080025
Dam Lam, R., Gasparatos, A., Chakraborty, S., Rivera, H., & Stanley, T. (2019). Multiple values and knowledge integration in indigenous coastal and marine social-ecological systems research: A systematic review. Ecosystem Services, 37, 100910. https://doi.org/10.1016/j.ecoser.2019.100910
Daniel, T. C., Muhar, A., Arnberger, A., Aznar, O., Boyd, J. W., Chan, K. M. A., Costanza, R., Elmqvist, T., Flint, C. G., Gobster, P. H., Gret-Regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R. G., Schauppenlehner, T., Sikor, T., Soloviy, I., Spierenburg, M., … von der Dunk, A. (2012). Contributions of cultural services to the ecosystem services agenda. Proceedings of the National Academy of Sciences, 109(23), 8812–8819. https://doi.org/10.1073/pnas.1114773109
Daníelsson, Á. (2005). Methods for environmental and economic accounting for the exploitation of wild fish stocks and their applications to the case of Icelandic fisheries. Environmental and Resource Economics, 31(4), 405–430. https://doi.org/10.1007/s10640-005-2176-5
Davies, B. B., & Hodge, I. D. (2012). Shifting environmental perspectives in agriculture: Repeated Q analysis and the stability of preference structures. Ecological Economics, 83, 51–57. https://doi.org/10.1016/j.ecolecon.2012.08.013
Davies, M. (2015). The consciousness of trees. Law and Literature, 27(2), 217–235. https://doi.org/10.1080/1535685X.2015.1034476
de Castro, E. V. (2004). Perspectival Anthropology and the Method of Controlled Equivocation. 22.
de Vente, J., Reed, M., Stringer, L., Valente, S., & Newig, J. (2016). How does the context and design of participatory decision making processes affect their outcomes? Evidence from sustainable land management in global drylands. Ecology and Society, 21(2). https://doi.org/10.5751/ES-08053-210224
Dempsey, J., & Collard, R.-C. (2017). If biodiversity offsets are a dead end for conservation, what is the live wire? A response to Apostolopoulou & Adams. Oryx, 51(1), 35–39. https://doi.org/10.1017/S0030605316000752
des Jardins, J. R. (1997). Environmental Ethics. International Thompson.
DeSilvey, C., & Harrison, R. (2020). Anticipating loss: Rethinking endangerment in heritage futures. International Journal of Heritage Studies, 26(1), 1–7. https://doi.org/10.1080/13527258.2019.1644530
Dewsbury, B. M., Bhat, M., & Fourqurean, J. W. (2016). A review of seagrass economic valuations: Gaps and progress in valuation approaches. Ecosystem Services, 18, 68–77. https://doi.org/10.1016/j.ecoser.2016.02.010
Diamond, J. M. (2003). Collapse: How Societies Choose to Succeed or Fail. Viking.
Díaz, M., Concepción, E. D., Oviedo, J. L., Caparrós, A., Farizo, B. Á., & Campos, P. (2020). A comprehensive index for threatened biodiversity valuation. Ecological Indicators, 108, 105696. https://doi.org/10.1016/j.ecolind.2019.105696
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., 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. M. A., Baste, I. A., Brauman, K. A., Polasky, S., Church, A., Lonsdale, M., Larigauderie, A., Leadley, P. W., van Oudenhoven, A. P. E., van der Plaat, F., Schröter, M., Lavorel, S., … Shirayama, Y. (2018). Assessing nature's contributions to people. Science (New York, N.Y.), 359(6373), 270–272. https://doi.org/10.1126/science.aap8826
Dicks, H. (2017). A New Way of Valuing Nature: Articulating Biomimicry and Ecosystem Services. https://doi.org/10.5840/ENVIROETHICS201739321
Dinerstein, E., Vynne, C., Sala, E., Joshi, A. R., Fernando, S., Lovejoy, T. E., Mayorga, J., Olson, D., Asner, G. P., Baillie, J. E. M., Burgess, N. D., Burkart, K., Noss, R. F., Zhang, Y. P., Baccini, A., Birch, T., Hahn, N., Joppa, L. N., & Wikramanayake, E. (2019). A Global Deal For Nature: Guiding principles, milestones, and targets. Science Advances, 5(4), eaaw2869. https://doi.org/10.1126/sciadv.aaw2869
Droz, L. (2019). Tetsuro Watsuji's Milieu and Intergenerational Environmental Ethics. https://doi.org/10.5840/enviroethics20194114
Dunlap, R., & Van Liere, K. (1984). Commitment to the Dominant Social Paradigm and Concern for Environmental Quality. Social Science Quarterly, 65, 1013–1028.
Dupras, J., Alam, M., & Reveret, J.-P. (2015). Economic value of Greater Montreal's non-market ecosystem services in a land use management and planning perspective. Canadian Geographer-Geographe Canadien, 59(1), 93–106. https://doi.org/10.1111/cag.12138
Duraiappah, A. K., Nakamura, K., Takeuchi, K., Watanabe, M., & Nishi, M. (2012). Satoyama–Satoumi Ecosystems and Human Well-Being: Socio-Ecological Production Landscapes of Japan. UNU Press. https://collections.unu.edu/view/UNU:2536
Duvall, P., Lennon, M., & Scott, M. (2018). The 'natures' of planning: Evolving conceptualizations of nature as expressed in urban planning theory and practice. European Planning Studies, 26(3), 480–501. https://doi.org/10.1080/09654313.2017.1404556
Eckersley, R., (2011), 'Representing Nature', in Alonso, S., Keane, J., & Merkel, W. (Eds.). (2011). The future of representative democracy. Cambridge University Press.
Edwards, D. M., Collins, T. M., & Goto, R. (2016). An arts-led dialogue to elicit shared, plural and cultural values of ecosystems. Ecosystem Services. https://doi.org/10.1016/j.ecoser.2016.09.018
Ekblom, A., Shoemaker, A., Gillson, L., Lane, P., & Lindholm, K.-J. (2019). Conservation through Biocultural Heritage—Examples from Sub-Saharan Africa. Land, 8(1), 5. https://doi.org/10.3390/land8010005
Elands, B. H. M., Vierikko, K., Andersson, E., Fischer, L. K., Gonçalves, P., Haase, D., Kowarik, I., Luz, A. C., Niemelä, J., Santos-Reis, M., & Wiersum, K. F. (2019). Biocultural diversity: A novel concept to assess human-nature interrelations, nature conservation and stewardship in cities. Urban Forestry & Urban Greening, 40, 29–34. https://doi.org/10.1016/j.ufug.2018.04.006
Eriksen, C. (2007). Why Do They Burn the "Bush"? Fire, Rural Livelihoods, and Conservation in Zambia. The Geographical Journal, 173(3), 242–256.
Escobedo, F. J., Kroeger, T., & Wagner, J. E. (2011). Urban forests and pollution mitigation: Analyzing ecosystem services and disservices. Environmental Pollution, 159(8–9), 2078–2087. https://doi.org/10.1016/j.envpol.2011.01.010
Faith, D. P., Magallón, S., Hendry, A. P., Conti, E., Yahara, T., & Donoghue, M. J. (2010). Ecosystem services: An evolutionary perspective on the links between biodiversity and human well-being. Current Opinion in Environmental Sustainability, 2(1–2), 66–74. https://doi.org/10.1016/j.cosust.2010.04.002
Fazey, I., Pettorelli, N., Kenter, J. O., Wagatora, D., & Schuett, D. (2011). Maladaptive trajectories of change in Makira, Solomon Islands. Global Environmental Change, 21(4), 1275–1289. https://doi.org/10.1016/j.gloenvcha.2011.07.006

Fernández-Llamazares, Á., & Cabeza, M. (2018). Rediscovering the Potential of Indigenous Storytelling for Conservation Practice: Indigenous storytelling and conservation. Conservation Letters, 11(3), 1–12. https://doi.org/10.1111/conl.12398

Fish, R., Church, A., Willis, C., Winter, M., Tratalos, J. A., Haines-Young, R., & Potschin, M. (2016). Making space for cultural ecosystem services: Insights from a study of the UK nature improvement initiative. Ecosystem Services, 21, 329–343. https://doi.org/10.1016/j.ecoser.2016.09.017

Fisher, D. E. (2010). Managing wetlands sustainably as ecosystems: The contribution of the law (part 1). The Journal of Water Law, 21(1), 19–32.

Fleming, P. J. S., Ballard, G., Reid, N. C. H., & Tracey, J. P. (2017). Invasive species and their impacts on agri-ecosystems: Issues and solutions for restoring ecosystem processes. Rangeland Journal, 39(5–6), 523–535. https://doi.org/10.1071/RJ17046

Folkersen, M. V. (2018). Ecosystem valuation: Changing discourse in a time of climate change. Ecosystem Services, 29, 1–12. https://doi.org/10.1016/j.ecoser.2017.11.008

Franco, L. S., Shanahan, D. F., & Fuller, R. A. (2017). A review of the benefits of nature experiences: More than meets the eye. International Journal of Environmental Research and Public Health, 14(8). https://doi.org/10.3390/ijerph14080864

Fredengren, C. (2015). Nature: Cultures: Heritage, Sustainability and Feminist Posthumanism. Current Swedish Archaeology, 23, 109-130.

Fuchs, R., Brown, C., & Rounsevell, M. (2020). Europe's Green Deal offshores environmental damage to other nations. Nature, 586(7831), 671–673. https://doi.org/10.1038/d41586-020-02991-1

Garcia, S., Abildtrup, J., & Stenger, A. (2018). How does economic research contribute to the management of forest ecosystem services? Annals of Forest Science, 75(2), 53. https://doi.org/10.1007/s13595-018-0733-7

Gardiner, M. M., Burkman, C. E., & Prajzner, S. P. (2013). The Value of Urban Vacant Land to Support Arthropod Biodiversity and Ecosystem Services. Environmental Entomology, 42(6), 1123–1136. https://doi.org/10.1603/en12275

Gerber, L. (2002, February 1). What is So Bad about Misanthropy? Environmental Ethics. https://doi.org/10.5840/enviroethics200224140

Gifford, R. (2014). Environmental Psychology Matters. Annual Review of Psychology, 65(1), 541–579. https://doi.org/10.1146/annurev-psych-010213-115048

Glaser, M. (2006). The Social Dimension in Ecosystem Management: Strengths and Weaknesses of Human-Nature Mind Maps. Human Ecology Review, 13(2), 21.

Gómez-Baggethun, E., de Groot, R., Lomas, P. L., & Montes, C. (2010). The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes. Ecological Economics, 69(6), 1209–1218. https://doi.org/10.1016/j.ecolecon.2009.11.007

Gomiero, T. (2016). Soil degradation, land scarcity and food security: Reviewing a complex challenge. Sustainability (Switzerland), 8(3). https://doi.org/10.3390/su8030281

Gould, R. K., Pai, M., Muraca, B., & Chan, K. M. A. (2019). He 'ike 'ana ia i ka pono (it is a recognizing of the right thing): How one indigenous worldview informs relational values and social values. Sustainability Science, 14(5), 1213–1232. https://doi.org/10.1007/s11625-019-00721-9

Graham, A., Ferrier, H., Mitchell, D., Jones, C., & Bicknell, P. (2013). Ecosystem Services: The Farmers' Challenge. Science, 342(6157), 420–421.

Graham, W. M., Gelcich, S., Robinson, K. L., Duarte, C. M., Brotz, L., Purcell, J. E., Madin, L. P., Mianzan, H., Sutherland, K. R., Uye, S., Pitt, K. A., Lucas, C. H., Bøgeberg, M., Brodeur, R. D., & Condon, R. H. (2014). Linking human well-being and jellyfish: Ecosystem services, impacts, and societal responses. Frontiers in Ecology and the Environment, 12(9), 515–523. https://doi.org/10.1890/130298

Gratani, M., Sutton, S. G., Butler, J. R. A., Bohensky, E. L., & Foale, S. (2016). Indigenous environmental values as human values. Cogent Social Sciences, 2(1), 1185811–1185811. https://doi.org/10.1080/23311886.2016.1185811

Gutierrez-Arellano, C., & Mulligan, M. (2018). A review of regulation ecosystem services and disservices from faunal populations and potential impacts of agriculturalisation on their provision, globally. Nature Conservation, 30, 1–39. https://doi.org/10.3897/natureconservation.30.26989

Hails, R. S., & Ormerod, S. J. (2013). Ecological science for ecosystem services and the stewardship of Natural Capital. Journal of Applied Ecology, 50(4), 807–810. https://doi.org/10.1111/1365-2664.12127

Hails, R. S., & Ormerod, S. J. (2013). Ecological science for ecosystem services and the stewardship of Natural Capital. Journal of Applied Ecology, 807-811.

Hay, R. (1998). SENSE OF PLACE IN DEVELOPMENTAL CONTEXT. Journal of Environmental Psychology, 18(1), 5–29. https://doi.org/10.1006/jevp.1997.0060

Helm, D. (2016) Natural Capital: Valuing the Planet. London: Yale University Press.

Hicks, C. C. (2011). How do we value our reefs? Risks and tradeoffs across scales in "biomass-based" economies. Coastal Management, 39(4), 358–376. https://doi.org/10.1080/08920753.2011.589219

Hough, R. L. (2014). Biodiversity and human health: Evidence for causality? Biodiversity and Conservation, 23(2), 267–288. https://doi.org/10.1007/s10531-013-0614-1

Ims, K. J. (2018). Quality of life in a deep ecological perspective. The need for a transformation of the western mindset? Society and Economy, 40(4), 531–552. https://doi.org/10.1556/204.2018.40.4.4

Ims, K. J. (2018). Quality of life in a deep ecological perspective. The need for a transformation of the Western mindset?. Society and Economy, 40(4), 531-552.

IPBES. (2018). The assessment report on land degradation and restoration (p. 748).

IPBES. (2019). The IPBES Global Assessment on Biodiversity and Ecosystem Services Chapter 5. Pathways towards a Sustainable Future (p. 157).

IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. Daszak, P., Amuasi, J., das Neves, C. G., Hayman, D., Kuiken, T., Roche, B., Zambrana-Torrelio, C., Buss, P., Dundarova, H., Feferholtz, Y., Földvári, G., Igbinosa, E., Junglen, S., Liu, Q., Suzan, G., Uhart, M., Wannous, C., Woolaston, K., Mosig Reidl, P., O'Brien, K., Pascual, U., Stoett, P., Li, H., Ngo, H. T., IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.41473

Irvine, K. N., O'Brien, L., Ravenscroft, N., Cooper, N., Everard, M., Fazey, I., Reed, M. S., & Kenter, J. O. (2016). Ecosystem services and the idea of shared values. Ecosystem Services, 21. https://doi.org/10.1016/j.ecoser.2016.07.001

Isaacs, R., Tuell, J., Fiedler, A., Gardiner, M., & Landis, D. (2009). Maximizing arthropod-mediated ecosystem services in agricultural landscapes: The role of native plants. Frontiers in Ecology and the Environment, 7(4), 196–203. https://doi.org/10.1890/080035

Ishihara, H. (2018). Relational values from a cultural valuation perspective: How can sociology contribute to the evaluation of ecosystem services? Current Opinion in Environmental Sustainability, 35, 61–68. Scopus. https://doi.org/10.1016/j.cosust.2018.10.016

Jackson, S., & Barber, M. (2013). Recognition of indigenous water values in Australia's Northern Territory: Current progress and ongoing challenges for social justice in water planning. Planning Theory & Practice, 14(4), 435–454. https://doi.org/10.1080/14649357.2013.845684

James, S. P. (2016). Cultural Ecosystem Services: A Critical Assessment. Ethics, Policy & Environment, 18(3), 338–350. https://doi.org/10.1080/21550085.2015.1111616

Janz, B. B. (2011). Watsuji Tetsuro, fūdo, and climate change. Journal of Global Ethics, 7(2), 173–184. https://doi.org/10.1080/17449626.2011.590277

Jones, K. E., Patel, N. G., Levy, M. A., Storeygard, A., Balk, D., Gittleman, J. L., & Daszak, P. (2008). Global trends in emerging infectious diseases. Nature, 451(7181), 990–993. https://doi.org/10.1038/nature06536

Jones-Walters, L., & Mulder, I. (2009). Valuing nature: The economics of biodiversity. Journal for Nature Conservation, 17(4), 245–247. https://doi.org/10.1016/j.jnc.2009.06.001

Jorda-Capdevila, D., & Rodríguez-Labajos, B. (2017). Socioeconomic Value(s) of Restoring Environmental Flows: Systematic Review and Guidance for Assessment: Value(s) of Restoring Environmental Flows. River Research and Applications, 33(3), 305–320. https://doi.org/10.1002/rra.3074

Kabii, T., & Horwitz, P. (2006). A review of landholder motivations and determinants for participation in conservation covenanting programmes. Environmental Conservation, 33(1), 11–20. https://doi.org/10.1017/S0376892906002761

Kasser, T. (2016). Materialistic Values and Goals. Annual Review of Psychology, 67(1), 489–514. https://doi.org/10.1146/annurev-psych-122414-033344

Kati, V., & Jari, N. (2016). Bottom-up thinking Identifying socio-cultural values of ecosystem services in local blue-green infrastructure planning in Helsinki, Finland. Land Use Policy, 50, 537–547. https://doi.org/10.1016/j.landusepol.2015.09.031

Keesing, F., Belden, L. K., Daszak, P., Dobson, A., Harvell, C. D., Holt, R. D., Hudson, P., Jolles, A., Jones, K. E., Mitchell, C. E., Myers, S. S., Bogich, T., & Ostfeld, R. S. (2010). Impacts of biodiversity on the emergence and transmission of infectious diseases. Nature, 468(7324), 647–652. https://doi.org/10.1038/nature09575

Keichi, K. (2016). Place, Body and Nature: Rethinking Japanese Sense of fūdo and Minamata Disease. Geographical Review of Japan Series B, 89(1), 32–45. https://doi.org/10.4157/geogrevjapanb.89.32

Kenter, J.O. (2016a). Editorial: Shared, plural and cultural values. Ecosystem Services, 21, 175–183. https://doi.org/10.1016/j.ecoser.2016.10.010

Kenter, J.O. (2016b). Integrating deliberative monetary valuation, systems modelling and participatory mapping to assess shared values of ecosystem services. Ecosystem Services, 21, 291–307. https://doi.org/10.1016/j.ecoser.2016.06.010

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, 40–43. https://doi.org/10.1016/j.ecoser.2018.08.002

Kenter, J.O., & O'Connor, S. (2022). The Life Framework of Values and living as nature; towards a full recognition of holistic and relational ontologies. Sustainability Science. In press.

Kenter, J.O., Hyde, T., Christie, M., & Fazey, I. (2011). The importance of deliberation in valuing ecosystem services in developing countries—Evidence from the Solomon Islands. Global Environmental Change, 21(2), 505–521. https://doi.org/10.1016/J.GLOENVCHA.2011.01.001

Kenter, J.O., Reed, M. S., Irvine, K. N., O'Brien, E., Brady, E., Bryce, R., Christie, M., Church, A., Cooper, N., Davies, A., Hockley, N., Fazey, I., Jobstvogt, N., Molloy, C., Orchard-Webb, J., Ravenscroft, N., Ryan, M., & Watson, V. (2014). UK National Ecosystem Assessment Follow-on. Work Package Report 6: Shared, Plural and Cultural Values of Ecosystems. (No. 2075805385; pp. 160–160). https://doi.org/10.1016/j.ehb.2003.08.003

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

Kim, J., & Kaplan, R. (2004). Physical and Psychological Factors in Sense of Community: New Urbanist Kentlands and Nearby Orchard Village. Environment and Behavior, 36(3), 313–340. https://doi.org/10.1177/0013916503260236

Kornatowska, B., & Sienkiewicz, J. (2018). Forest ecosystem services-assessment methods. Folia Forestalia Polonica. Series A, Forestry, 60(4), 248-260.
Kremen, C. (2018). The value of pollinator species diversity. Science, 359(6377), 741–742. https://doi.org/10.1126/science.aar7614
Langholz, J.A., Lassoie, J. and Schellas, J. (2000) Incentives for biological conservation: Costa Rica's Private Wildlife Refuge Program. Conservation Biology, 14:1735–1743.
Lepofsky, D., & Caldwell, M. (2013). Indigenous marine resource management on the northwest coast of North America. Ecological Processes, 2(1). https://doi.org/10.1186/2192-1709-2-12
Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? Journal of Environmental Psychology, 31(3), 207–230. https://doi.org/10.1016/j.jenvp.2010.10.001
Lewis-Beck et al. (2004). Conceptualization, Operationalization, and Measurement, in: *The SAGE Encyclopedia of Social Science Research Methods.* Sage Publications, Inc., 2455 Teller Road, Thousand Oaks California 91320 United States of America. https://doi.org/10.4135/9781412950589.n150
Linton, J. (2010). What Is Water?: The History of a Modern Abstraction.
Lintott, S. (2006). Toward Eco-Friendly Aesthetics. ENVIRONMENTAL ETHICS, 28, 20.
Liu, C. J., Duan, Y. L., Jin, R. Z., Han, Y. Y., Hao, J. H., & Fan, S. X. (2018). Spent mushroom substrates as component of growing media for lettuce seedlings. IOP Conference Series: Earth and Environmental Science, 185. https://doi.org/10.1088/1755-1315/185/1/012016
Locke, P. (2018). Multispecies Ethnography. In H. Callan (Ed.), The International Encyclopedia of Anthropology (1st ed.). Wiley. https://doi.org/10.1002/9781118924396
Lorimer, J., & Srinivasan, K. (2013). Animal geographies. In N. Johnson, R. Schein, & J. Winders (Eds.), The Wiley-Blackwell companion to cultural geography. (pp. 332–342). Wiley-Blackwell. http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0470655593.html
Lubarda, B. (2020). Beyond Ecofascism? Far-Right Ecologism (FRE) as a Framework for Future Inquiries. Environmental Values, 29(6), 713–732. https://doi.org/10.3197/096327120x15752810323922
Lundy, B. (2012). Economic Anthropology—Wiley Online Library. https://anthrosource.onlinelibrary.wiley.com/journal/23304847
Lynch, A. J., Cooke, S. J., Deines, A. M., Bower, S. D., Bunnell, D. B., Cowx, I. G., Nguyen, V. M., Nohner, J., Phouthavong, K., Riley, B., Rogers, M. W., Taylor, W. W., Woelmer, W., Youn, S.-J., & Beard, T. D. (2016). The social, economic, and environmental importance of inland fish and fisheries. Environmental Reviews, 24(2), 115–121. https://doi.org/10.1139/er-2015-0064
Lyytimäki, J., & Sipilä, M. (2009). Hopping on one leg – The challenge of ecosystem disservices for urban green management. Urban Forestry & Urban Greening, 8(4), 309–315. https://doi.org/10.1016/j.ufug.2009.09.003
Mace, G. M. (2014). Whose conservation? Science, 345(6204), 1558–1560. https://doi.org/10.1126/science.1254704
Martinez-Alier, J. (2003). The Environmentalism of the poor: A study of ecological conflicts and valuation. Edward Elgar Publishing.
Massey, D. (2005). For Space. SAGE.
Mazumdar, S., & Mazumdar, S. (2004). Religion and place attachment: A study of sacred places. Journal of Environmental Psychology, 24(3), 385–397. https://doi.org/10.1016/j.jenvp.2004.08.005
McAlpine, K. G., & Wotton, D. M. (2009). Conservation and the delivery of ecosystem services. Science for Conservation, 295, 5–81.
Meffe, G. K., & Caroll, C. R. (1994). Principles of Conservation Biology. Sinauer.
Mgumia, F. H., & Oba, G. (2003). Potential role of sacred groves in biodiversity conservation in Tanzania. Environmental Conservation, 30(3), 259–265. https://doi.org/10.1017/S0376892903000250

Milcu, A. I., Hanspach, J., Abson, D., & Fischer, J. (2013). Cultural Ecosystem Services: A Literature Review and Prospects for Future Research. Ecology and Society, 18(3).
Millennium Ecosystem Assessment (Ed.). (2005). Ecosystems and human well-being: Synthesis. Island Press.
Momblanch, A., Connor, J. D., Crossman, N. D., Paredes-Arquiola, J., & Andreu, J. (2016). Using ecosystem services to represent the environment in hydro-economic models. Journal of Hydrology, 538, 293–303. https://doi.org/10.1016/j.jhydrol.2016.04.019
Moore, B.L. (2008). Ecocentric Personification in American Nature Writing. Ecology and Literature 143–192. https://doi.org/10.1057/9780230614659_4
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
Muraca, B. (2016). Re-appropriating the Ecosystem Services concept for a decolonization of "nature." In Nature and Experience—Phenomenology and the Environment. (pp. 143–156).
Naess, A. (1973). The shallow and the deep, long-range ecology movement. A summary∗. Inquiry, 16(1–4), 95–100. https://doi.org/10.1080/00201747308601682
Nesbitt, L., Hotte, N., Barron, S., Cowan, J., & Sheppard, S. R. J. (2017). The social and economic value of cultural ecosystem services provided by urban forests in North America: A review and suggestions for future research. Urban Forestry & Urban Greening, 25, 103–111. https://doi.org/10.1016/j.ufug.2017.05.005
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. Scopus. https://doi.org/10.1007/s11625-019-00715-7
O'Neill, J., Holland, A., & Light, A. (2008). Environmental values. Routledge.
Ogden, L. A., Hall, B., & Tanita, K. (2013). Animals, Plants, People, and Things: A Review of Multispecies Ethnography. Environment and Society, 4(1). https://doi.org/10.3167/ares.2013.040102
O'Neill, J. (2001). Representing people, representing nature, representing the world. Environment and Planning C: Government and Policy, 19(4), 483-500.
Pascual, U., Balvanera, P., Diaz, 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., Asah, S. T., … Yagi, N. (2017). Valuing nature's contributions to people: The IPBES approach. Current Opinion in Environmental Sustainability, 26–27, 7–16. https://doi.org/10.1016/j.cosust.2016.12.006
Paterson, B. (2006). Ethics for wildlife conservation: overcoming the human–nature dualism. BioScience, 56(2), 144-150.
Pecl, G. T., Araújo, M. B., Bell, J. D., Blanchard, J., Bonebrake, T. C., Chen, I.-C., Clark, T. D., Colwell, R. K., Danielsen, F., Evengård, B., Falconi, L., Ferrier, S., Frusher, S., Garcia, R. A., Griffis, R. B., Hobday, A. J., Janion-Scheepers, C., Jarzyna, M. A., Jennings, S., … Williams, S. E. (2017). Biodiversity redistribution under climate change: Impacts on ecosystems and human well-being. Science, 355(6332), eaai9214–eaai9214. https://doi.org/10.1126/science.aai9214
Pendola, R., & Gen, S. (2008). Does "Main Street" Promote Sense of Community? A Comparison of San Francisco Neighborhoods. Environment and Behavior, 40(4), 545–574. https://doi.org/10.1177/0013916507301399
Pereira, L. M., Davies, K. K., den Belder, E., Ferrier, S., Karlsson-Vinkhuyzen, S., Kim, H., ... & Lundquist, C. J. (2020). Developing multiscale and integrative nature–people scenarios using the Nature Futures Framework. People and Nature, 2(4), 1172-1195.
Perez-Verdin, G., Sanjurjo-Rivera, E., Galicia, L., Hernandez-Diaz, J. C., Hernandez-Trejo, V., & Marquez-Linares, M. A. (2016). Economic valuation of ecosystem services in Mexico: Current status and trends. Ecosystem Services, 21, 6–19. https://doi.org/10.1016/j.ecoser.2016.07.003

Pidgeon, N. (2020). Engaging publics about environmental and technology risks: Frames, values and deliberation. Journal of Risk Research, 0(0), 1–19. https://doi.org/10.1080/13669877.2020.1749118

Poe, M. R., Norman, K. C., & Levin, P. S. (2014). Cultural dimensions of socioecological systems: Key connections and guiding principles for conservation in coastal environments. Conservation Letters, 7(3), 166–175. https://doi.org/10.1111/conl.12068

Polasky, S., Tallis, H., & Reyers, B. (2015). Setting the bar: Standards for ecosystem services. Proceedings of the National Academy of Sciences of the United States of America, 112(24), 7356–7361. https://doi.org/10.1073/pnas.1406490112

Ramose, M. B. (1999). African philosophy through ubuntu. Mond Books.

Rapidel, B., Ripoche, A., Allinne, C., Metay, A., Deheuvels, O., Lamanda, N., Blazy, J.-M., Valdés-Gómez, H., & Gary, C. (2015). Analysis of ecosystem services trade-offs to design agroecosystems with perennial crops. Agronomy for Sustainable Development, 35(4), 1373–1390. https://doi.org/10.1007/s13593-015-0317-y

Rautela, P. (2005). Indigenous technical knowledge inputs for effective disaster management in the fragile Himalayan ecosystem. Disaster Prevention and Management: An International Journal, 14(2), 233–241. https://doi.org/10.1108/09653560510595227

Raymond, C. M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M. R., Geneletti, D., & Calfapietra, C. (2017). A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. Environmental Science & Policy, 77, 15–24. https://doi.org/10.1016/j.envsci.2017.07.008

Raymond, H. (2007). The Ecologically Noble Savage Debate. Annual Review of Anthropology, 36(1), 177–190. https://doi.org/10.1146/annurev.anthro.35.081705.123321

Rea, A. W., Davis, C., Evans, D. A., Heninger, B. T., & Van Houtven, G. (2012). Using Ecosystem Services To Inform Decisions on U.S. Air Quality Standards. Environmental Science & Technology, 46(12), 6481–6488. https://doi.org/10.1021/es3003876

Redpath, S. M., Young, J., Evely, A., Adams, W. M., Sutherland, W. J., Whitehouse, A., Amar, A., Lambert, R. A., Linnell, J. D. C., Watt, A., & Gutierrez, R. J. (2013). Understanding and managing conservation conflicts. Trends in Ecology and Evolution, 28(2), 100–109. https://doi.org/10.1016/j.tree.2012.08.021

Reed, M. S., Moxey, A., Prager, K., Hanley, N., Skates, J., Bonn, A., Evans, C. D., Glenk, K., & Thomson, K. (2014). Improving the link between payments and the provision of ecosystem services in agri-environment schemes. Ecosystem Services, 9, 44–53. https://doi.org/10.1016/j.ecoser.2014.06.008

Reyers, B., Biggs, R., Cumming, G. S., Elmqvist, T., Hejnowicz, A. P., & Polasky, S. (2013). Getting the measure of ecosystem services: A social–ecological approach. Frontiers in Ecology and the Environment, 11(5), 268–273. https://doi.org/10.1890/120144

Reyes-García, V., Fernández-Llamazares, Á., McElwee, P., Molnár, Z., Öllerer, K., Wilson, S. J., & Brondizio, E. S. (2019). The contributions of Indigenous Peoples and local communities to ecological restoration. Restoration Ecology, 27(1), 3–8. https://doi.org/10.1111/rec.12894

Riedy, C. (2020). Discourse coalitions for sustainability transformations: Common ground and conflict beyond neoliberalism. Current Opinion in Environmental Sustainability, 45, 100–112. https://doi.org/10.1016/j.cosust.2020.09.014

Ringler, C. (2008). The Millennium Ecosystem Assessment: Tradeoffs between food security and the environment. Turkish Journal of Agriculture and Forestry, 32(3), 147–157. https://doi.org/10.3906/tar-0802-37

Ripple, W. J., Wolf, C., Newsome, T. M., Barnard, P., & Moomaw, W. R. (2019). World Scientists' Warning of a Climate Emergency. Bioscience, 5, 969. https://doi.org/10.1093/biosci/biz088

Ruiz-Sandoval, D., Arana-Coronado, J. J., Godbout, S., Sandoval-Salas, F., & Brambila-Paz, J. J. (2019). Economic valuation of three ecosystem services before the establishment of a greenbelt of Quebec City forest, Canada. Revista Chapingo, Serie Ciencias Forestales y Del Ambiente, 25(1), 3–15. https://doi.org/10.5154/r.rchscfa.2018.04.036

Rupprecht, C., Vervoort, J., Berthelsen, C., Mangnus, A., Osborne, N., Thompson, K., Urushima, A., Kóvskaya, M., Spiegelberg, M., Cristiano, S., Springett, J., Marschuetz, B., Flies, E., McGreevy, S., Droz, L., Breed, M., Gan, J., Shinkai, R., & Kawai, A. (2020). Multispecies Sustainability. https://doi.org/10.31235/osf.io/8j53u

Russo, A., Escobedo, F. J., Cirella, G. T., & Zerbe, S. (2017). Edible green infrastructure: An approach and review of provisioning ecosystem services and disservices in urban environments. Agriculture, Ecosystems and Environment, 242, 53–66. https://doi.org/10.1016/j.agee.2017.03.026

Schwartz, S. H. (1992). Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. In Advances in Experimental Social Psychology (Vol. 25, pp. 1–65). Elsevier. https://doi.org/10.1016/S0065-2601(08)60281-6

Schwartz, S. H. (1994). Are there universal aspects in the structure and contents of human values? Journal of Social Issues, 50(4), 19–45. https://doi.org/10.1111/j.1540-4560.1994.tb01196.x

Sheremata, M. (2018). Listening to relational values in the era of rapid environmental change in the Inuit Nunangat. Current Opinion in Environmental Sustainability, 35, 75–81. https://doi.org/10.1016/j.cosust.2018.10.017

Singh, N. M. (2018). Introduction: Affective Ecologies and Conservation. Conservation and Society, 15(1), 1–7. https://doi.org/10.4103/cs.cs_18_33

Sites and Cultural Landscape; UNESCO: Paris, France, pp. 1–340.

Sivakumar, G., Yu, K. W., & Paek, K. Y. (2005). Biosafe ginseng: A novel source for human well-being. Engineering in Life Sciences, 5(6), 527–533. https://doi.org/10.1002/elsc.200520100

Skubel, R. A., Shriver-Rice, M., & Maranto, G. M. (2019). Introducing Relational Values as a Tool for Shark Conservation, Science, and Management. Frontiers in Marine Science, 6. https://doi.org/10.3389/fmars.2019.00053

Spanou, E., Kenter, J. O., & Graziano, M. (2020). The Effects of Aquaculture and Marine Conservation on Cultural Ecosystem Services: An Integrated Hedonic – Eudaemonic Approach. Ecological Economics, 176, 106757. https://doi.org/10.1016/j.ecolecon.2020.106757

Štante, N.F. (2010). Ecological interdependence and the question of identity: From the perspective of Christian ecofeminist theology. Soc. ekol. Zagreb 19, 293–304.

Stephens, C., & Athias, R. (2015). Focus on biodiversity, health and wellbeing. Environmental Research Letters, 10(12), 120401–120401.

Strang, V. (2005). Knowing me, knowing you: Aboriginal and European concepts of nature as self and other. Worldviews: Environment, Culture, Religion, 9(1), 25–56. https://doi.org/10.1163/1568535053628463

Sundberg, J. (2014). Decolonizing posthumanist geographies. Cultural Geographies, 21(1), 33–47. https://doi.org/10.1177/1474474013486067

Takeuchi, K., Elmqvist, T., Hatakeyama, M., Kauffman, J., Turner, N., & Zhou, D. (2014). Using sustainability science to analyse social–ecological restoration in NE Japan after the great earthquake and tsunami of 2011. Sustainability Science, 9(4), 513–526. https://doi.org/10.1007/s11625-014-0257-5

Takeuchi, Kazuhiko. (2010). Rebuilding the relationship between people and nature: The Satoyama Initiative. Ecological Research, 25(5), 891–897. https://doi.org/10.1007/s11284-010-0745-8

Tengö, M., Brondizio, E. S., Elmqvist, T., Malmer, P., & Spierenburg, M. (2014). Connecting diverse knowledge systems for enhanced ecosystem governance: The multiple evidence base approach. Ambio, 43(5), 579–591. https://doi.org/10.1007/s13280-014-0501-3

Todd, Z. (2016). An Indigenous Feminist's Take On The Ontological Turn: 'Ontology' Is Just Another Word For Colonialism. Journal of Historical Sociology, 29(1), 4–22. https://doi.org/10.1111/johs.12124

UNESCO (2005) Conserving Cultural and Biological Diversity: The Role of Sacred Natural

Ushedo, B. O., & Ehiri, J. E. (2006). Ethical challenges in ecological policy: Global thinking and local action. Management of Environmental Quality: An International Journal, 17(1), 31-42.

Van der Knaap, M. (2013). May we eat biodiversity? How to solve the impasse of conservation and exploitation of biodiversity and fishery resources. Aquatic Ecosystem Health and Management, 16(2), 164–171. https://doi.org/10.1080/14634988.2013.799986
van Dooren, T., Kirksey, E., & Münster, U. (2016). Multispecies Studies: Cultivating Arts of Attentiveness. Environmental Humanities, 8(1), 1–23. https://doi.org/10.1215/22011919-3527695
Viveiros De Castro, E. (2004). Perspectival Anthropology and the Method of Controlled Equivocation. Tipitı : Journal of the Society for the Anthropology of Lowland South America 2, 3–22.
Volenec, Z. M., & Dobson, A. P. (2020). Conservation value of small reserves. Conservation Biology, 34(1), 66-79.
Waddock, S. (2016). Foundational Memes for a New Narrative About the Role of Business in Society. Humanistic Management Journal 1–15. https://doi.org/10.1007/s41463-016-0012-4
Waddock, S. (2020). Reframing and Transforming Economics around Life. Sustainability 12, 7553–16. https://doi.org/10.3390/su12187553
WCED. (1987). Brundtland Report—Our common Future.
Weisberg, H. F. (1974) 'Models of Statistical Relationship'. The American Political Science Review, 68(4):1638–1655.
Westlund, S. (2010). Incorporating 'the earth and skies, the winds and rocks': 1 nature as an active participant in conflict transformation and peacebuilding. Global Change, Peace & Security, 22(3), 297–313. https://doi.org/10.1080/14781158.2010.510244
Whatmore, S. (2006). Materialist returns: Practising cultural geography in and for a more-than-human world. Cultural Geographies, 13(4), 600–609. https://doi.org/10.1191/1474474006cgj377oa
White, P. C. L., Godbold, J. A., Solan, M., Wiegand, J., & Holt, A. R. (2010). Ecosystem services and policy: A review of coastal wetland ecosystem services and an efficiency-based framework for implementing the ecosystem approach. Issues in Environmental Science and Technology, 30, 29–51.
Wiedmaier, B. (2018) 'Phi Coefficient', in The SAGE Encyclopedia of Communication Research Methods. SAGE Publications, Inc: Thousand Oaks.
Xu, X., Tan, Y., Chen, S., & Yang, G. (2014). Changing patterns and determinants of natural capital in the Yangtze River Delta of China 2000-2010. Science of the Total Environment, 466, 326–337. https://doi.org/10.1016/j.scitotenv.2013.07.043
Zent, E. L. (2013). Insight: How the Joti concept of kyo jkaini could help the West live sustainably

Annex 2.14 Analysis of framing in the environmental values literature

Introduction

The way a problem is understood, presented and discussed (i.e., problem "framing") directly affects outcomes by prioritizing the types of values considered and the valuation approaches adopted (Christie et al., 2019; Jax et al., 2013; Norton, 2017, *2.3.2*). In many decision contexts, policymakers seek to optimise the allocation of resources to environmental management objectives by drawing on economic indicators. Framing the problem this way can mean that other values (e.g., maintaining traditional livelihoods or relational values between people and place) are not considered (Jax, 2019).

Concerns about framing infuse environmental issues, and are commonly identified as a primary determinant of how action proceeds (Ford et al. 2019). This importance relates closely to the importance of problem definition in many fields: how a problem is defined immediately and strongly impacts what responses are appropriate. As Albert Einstein reportedly said, "If I had only one hour to save the world, I would spend fifty-five minutes defining the problem, and only five minutes finding the solution." Framing is about defining problems. In addition, power concerns are central to issues of framing - those with power often determine a problem's framing, and thus also determine whose perspectives are prioritized.

This annex explores papers that were identified, in a systematic literature review of scholarly literature on environmental values, as addressing the issue of framing in environmental values and valuation work. The goal of this present analysis was to systematically characterize how these 115 articles discussed framing.

Methods

In the primary Systematic review of Value Types literature review[22], one of the categories coders described was whether or not the article addressed "how values or knowledge are being obscured or prioritized" -- i.e., the article addressed framing. The coding team identified 115 papers that addressed this category. When coders determined that a manuscript addressed the issue of framing, they then summarized (in 1-5 sentences) what the article said about framing.

In the present analysis, these summaries were analysed using thematic coding techniques. First, all summaries were read to gain an overview of how manuscripts addressed framing and detect any high-level patterns. In this process, it was noticed that many of the summaries followed a similar structure, as dictated by the coding category: summaries noted that manuscripts highlighted how framing a valuation process (a policy context, a scholarly discussion, or other) about a particular type of value, worldview, or disciplinary focus served to obscure other types of value, worldviews, or disciplinary focus.

NVivo 12 software was used to code for two main categories: the framing used (value, worldview, or disciplinary focus), and the obscured topic (value, worldview, or disciplinary focus). Coding categories were created from the data based on the following process. First, we analyzed all 115 summaries and created categories that were inclusive of all reported entities in both the "framing used" and "obscured topic" categories. Second, we analyzed these full inclusive lists, and grouped the categories conceptually to streamline the data and allow more distilled portrayal of the findings.

[22] Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).

The "framing used" list includes value types, worldviews, concepts, and fields that the literature suggested made it difficult to recognize or address other value types, etc. The "obscured topic" list includes values types, worldviews, and concepts that the literature described as being made either invisible or more difficult to include by the structure of the decision-making process or valuation framework. The lists of coding categories are presented in *Table SM2.12*.

Results

This review identified 114 scholarly publications that address concepts commonly used to frame environmental values. Though the frames reviewed encompass worldviews, disciplines, valuation approaches and human-nature relationship frameworks, a core finding is that employing any one frame inherently obscures values that are not evident within that particular perspective.

The most common frames discussed in the literature as obscuring other value types were economic disciplinary perspectives (19 papers), ecosystem services approaches (16 papers), instrumental values foci (11 papers) and a Western worldview (9 papers). In most cases, the papers' authors identified one of these frames, then specified one or more types of values obscured by that framing. Publications that discussed how economics omits other values, for instance, noted that such framing obscures intrinsic value justification (five papers), ILK perspectives (two papers), relational value justification (two papers), non-monetized values (two papers), holistic livelihood concerns (one paper) and diverse worldviews (two papers). Seven papers that discussed how economics framings obscure other values did not specify the values being obscured. (Multiple papers described how economics framing obscured more than one other topic, so the sum of the "Topics obscured" by economics exceeds the number of papers that described economics framing as obscuring other topics.) Scholars that discussed how ecosystem services obscure other values, as a second example, noted that this framing obscures intrinsic value justifications (six papers), relational value justifications (four papers), diverse worldviews (two papers), biodiversity concerns (one paper), ILK perspectives (one paper), and non-monetized values (one paper). One paper that discussed how ecosystem-services framings obscure other values did not specify the value types being obscured.

Table SM2.12 Results of coding of entities that the literature described as obscuring others, and those that the literature described as being obscured.

Role according to the literature	Category	Number of papers listing this entity in this role
Framing used	Economics	19
	Ecosystem services	16
	Instrumental	11
	Western	9
	conservation science	6
	Not Explicit	6
	Conventional (general)	5
	Anthropocentric	4
	Techno-Consumer-Corporate	4
	Rights.Values conceptions	4
	Intrinsic	3
	Dualistic (Intrinsic Instrumental)	3
	Rationality	2
	Interests of Nations	1
Obscured topic	Intrinsic	20
	Relational values	16
	Other values (various)	13
	Not explicit	11
	ILK	5
	Rights and Power	5
	diverse worldviews, knowledge systems	4
	Livelihood	3
	Biodiversity	2
	Emotion	2
	Intrinsic and instrumental	1

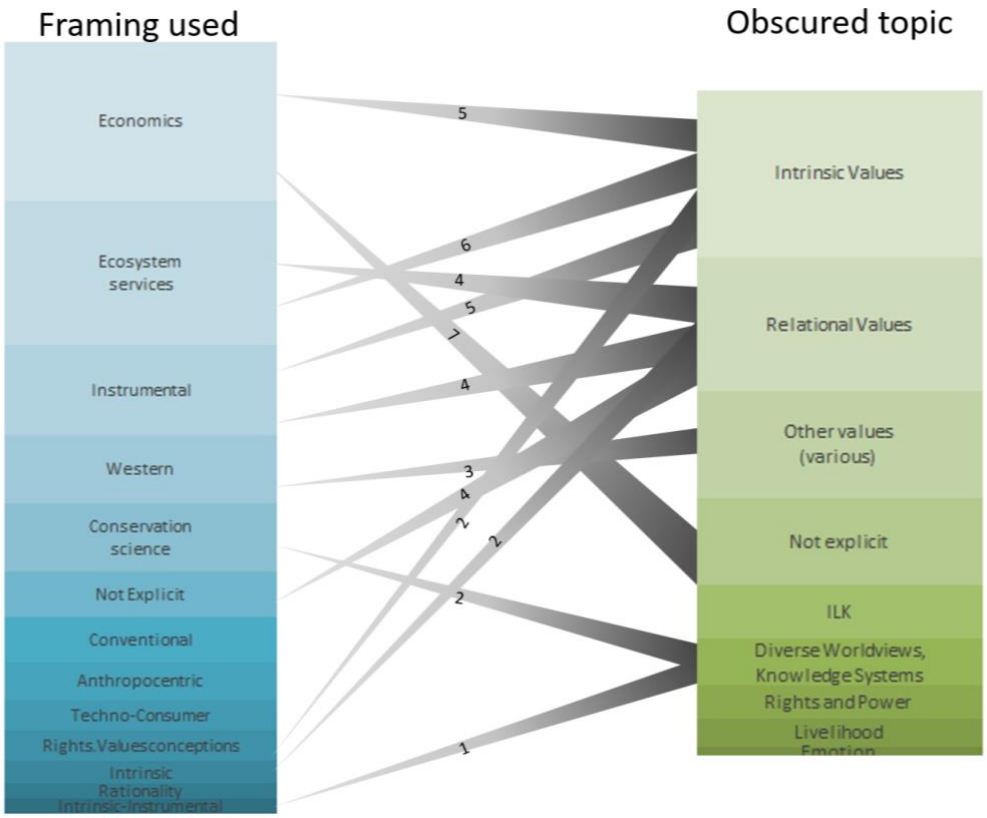

Figure SM2.27 Depiction of interactions, as reported in the literature, between entities that were used to frame and describe situations, and entities that were obscured. Only a subset of interactions is depicted. Height of each box is proportional to the number of papers that identified that concept (e.g., Economics; Intrinsic Values) in that role. Shaded wedges indicate connections between framing used and obscured topic; the thickness of the wedge and corresponding number on each wedge indicate how many manuscripts identified that particular pairing of framing used and obscured topic.

Conclusion

Problem framing highlights some values (and value indicators) and obscures others. Therefore, decision-makers can apply concerted efforts to describe a problem before addressing it (Pascual et al., 2017), and recognize the importance and trade-offs involved in choosing particular framings.

Two important dimensions decision-makers can consider are whether the values involved are: (a) broad or specific, and (b) generalized or place-based (Díaz et al., 2018). Considering the first dimension, decision-makers could ask themselves if the issue concerns principles regarding what is considered a good quality-of-life or about context-specific concerns (e.g., specific NCP). Attention to how the situation is framed could help decision-makers consider and then operationalize the appropriate balance between actors' broad and specific values in the particular situation. Considering the second dimension, decision-makers could ask, for a given situation, whether generalization (across spatial, temporal or social scales) is important, or whether it requires place-specific values (in which case, the boundaries of the 'place', including actors, institutions and processes, would be explicitly defined).

This analysis demonstrates that discussing and framing an issue in a particular way can have important consequences for what values can be part of the decision-making conversation. Understanding this impact is an important step to holistic and informed decision-making that leaves space for the multiple values of nature.

References

Christie, M., Martín-López, B., Church, A., Siwicka, E., Szymonczyk, P., & Mena Sauterel, J. (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. Scopus. https://doi.org/10.1007/s11625-019-00716-6

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., Hill, R., Chan, K. M. A., Baste, I. A., Brauman, K. A., Polasky, S., Church, A., Lonsdale, M., Larigauderie, A., Leadley, P. W., van Oudenhoven, A. P. E., van der Plaat, F., Schröter, M., Lavorel, S., … Shirayama, Y. (2018). There is more to Nature's Contributions to People than Ecosystem Services – A response to de Groot et al. *Science Letters*, *359*(6373). http://science.sciencemag.org/content/359/6373/270/tab-e-letters

Ford, R. M., Rawluk, A., & Williams, K. J. H. (2019). Managing values in disaster planning: Current strategies, challenges and opportunities for incorporating values of the public. *Land Use Policy*, *81*, 131–142. https://doi.org/10.1016/j.landusepol.2018.10.029

Jax, K. (2019). Taking Social Responsibility in Using Ecosystem Services Concepts: Ethical Issues of Linking Ecosystems and Human Well-Being. In M. Schröter, A. Bonn, S. Klotz, R. Seppelt, & C. Baessler (Eds.), *Atlas of Ecosystem Services: Drivers, Risks, and Societal Responses* (pp. 25–31). Springer International Publishing. https://doi.org/10.1007/978-3-319-96229-0_6

Jax, K., Barton, D., Chan, K., Groot, R., Doyle, U., Eser, U., Görg, C., Gómez-Baggethun, E., Griewald, Y., Haber, W., Haines-Young, R., Heink, U., Jahn, T., Joosten, H., Kerschbaumer, L., Korn, H., Luck, G., Matzdorf, B., Muraca, B., … Wichmann, S. (2013). Ecosystem services and ethics. *Ecological Economics*, *93*, 260–268. https://doi.org/10.1016/j.ecolecon.2013.06.008

Norton, B. G. (2017). A Situational Understanding of Environmental Values and Evaluation. *Ecological Economics*, *138*, 242–248. https://doi.org/10.1016/j.ecolecon.2017.03.024

Pascual, U., Balvanera, P., Díaz, S., Pataki, G., Roth, E., Stenseke, M., Watson, R. T., Başak Dessane, E., Islar, M., Kelemen, E., Maris, V., Quaas, M., Subramanian, S. M., Wittmer, H., Adlan, A., Ahn, S. E., Al-Hafedh, Y. S., Amankwah, E., Asah, S. T., … Yagi, N. (2017). Valuing nature's contributions to people: The IPBES approach. *Current Opinion in Environmental Sustainability*, *26–27*, 7–16. https://doi.org/10.1016/j.cosust.2016.12.006

Annex 2.15 Values and decision-making

The aim of this annex is to discuss how values of nature are and can be taken into account in different forms of decision-making – i.e., economic, political and socio-cultural decision-making as outlined in *Chapter 1*. It moreover builds on the classifications of values in and the understanding of human action and the role of institutions as presented in *Chapter 2*.

The annex is based on what *Chapter 2* defines as a stage II literature review. It is, hence, based on expert knowledge about the literature plus a series of systematic searches on keywords essential to the topics approached in the annex to verify and complement expert insights[23]. It is structured as follows. First, we explore what characterises key challenges of environmental decision-making. Thereafter, we present what distinguishes the values underpinning different types of decisions as listed above. More specifically, economic growth has become a dominant goal for economic policy. The third part, is therefore focused on how this goal got this position and what the main impacts for values of nature have been. We close by analysing what characterises the environmental policies instituted to handle the impacts on nature that have followed from a growing economy.

The basic challenge of environmental decision-making

The values of nature present some distinct challenges for decision-making. Our physical environment is a system of interacting processes across space and time. This implies that single decisions regarding nature – be they made by individual people, households, social groups or firms – will influence the conditions also for other people and other living beings. Hence, positive or negative impacts on nature and nature's values coming from various actions will typically be shared by many more than the one(s) that causes the impact. Albeit formulated differently, this is acknowledged as an important challenge both in mainstream economics[24], ecological and institutional economics (e.g., Bromley, 1991; Common and Stagl, 2005; Ostrom, 2005; Vatn, 2015; Field, 2016; Tietenberg and Lewis, 2020). This situation represents a challenge since it may not make sense for the individual actor - be it a person, a firm, a community etc. - to increase (what is considered) positive impacts upon others and limit (what is considered) negative ones. The actor may only consider what is best for that actor only and *effects on others* - including other than human - are not taken into account. We encounter what in the literature is termed *free-rider problems* (e.g., Kolstad, 2000; Common and Stagl, 2005).

One may question how prevalent intrusions into each other's lives through changing nature are. In mainstream economics these interferences are termed *externalities* – i.e., interactions that happen outside of markets and are therefore not voluntary. Externalities are seen as incidents that happen when markets sometimes fail. The ecological economics literature (e.g., Georgescu-Roegen, 1971; Daly, 1977) represents a different understanding. These authors see the economy as embedded in the environment, implying that the effects we talk about here are pervasive. They argue that any human activity depends on nature both as source (e.g., raw materials) and sink (e.g., for various types of waste). Some effects of individual actions may mainly be considered positive also for others – e.g., the creation of certain cultural landscapes. Some will have little or no impact. That happens in cases where nature has the capacity to fully reproduce sources and sinks. However, in many – nowadays in

[23] Literature review regarding values, valuation and decision-making (https://doi.org/10.5281/zenodo.4396349).
[24] By mainstream, we refer to neoclassical economics.

most – situations, sources have limited capacity and sinks are congested, and we experience loss of values of nature caused by the scale and number of individual actions as illustrated by climate change, biodiversity loss and a series of pollution problems. These effects typically impact the lives of people to a different degree, depending on their livelihoods and capacity to protect themselves. Moreover, effects go beyond those that are tangible and impact cultural values associated with different practices related to nature and nature's use. What is considered valuable in nature is furthermore dependent on social and cultural processes.

Another issue regards what values and motivations seem to be underlying the perspective of free-riding. Certainly, if broad values like justice, sustainability and care were motivating decisions, one would expect decision-makers to take potential effects on nature and other people into account when making decisions. They would act socially rationally. Hence, the free-rider argument is based on an (implicit) assumption that actions are rooted in individual rationality/selfishness. That may be reasonable for several reasons. Actors may simply be self-centered. Moreover, even if intending to (also) act to the better of others, it will typically be very demanding for the individual actor to monitor all side-effects of his/her own actions. Hence, ensuring conditions for realizing the broad values of justice, sustainability and care may be very demanding at societal scales.

Interactions in nature are largely 'mutual'. An ecosystem and the species living there maintain themselves through interactions and relations that sustain both each species and the system as a whole. At the same time, all ecosystems are dynamic. As an example, the number of individuals of a species will vary over time and the species will moreover adapt to changes in the conditions through genetic processes. Without that capacity, species as well as ecosystems would go extinct[25]. While natural processes are able to maintain themselves for long periods through different naturally produced 'checks and balances', the human species has expanded so quickly that no natural processes can create the necessary checks to avoid collapse. Hence, as humans, we depend on our own capacity to deliberately create systems that keep the impacts of our actions on nature within bounds. While our expansion has been dependent on technological and institutional changes, also our capacity to keep within nature's limits depends on these factors. The fact that we are passing boundaries not only at local, but also at Earth system's level (Rockström et al., 2009), implies that there is a great need to develop ways to collectively change our relationships with nature to maintain nature's integrity and its capacity to produce the different NCPs so important for human wellbeing.

While both technological and institutional change is important for making humanity stay within nature's boundaries, the present annex will focus on the institutional aspects of this challenge. It is through developing or changing institutions that we create conditions for coordinating our activities. In the context of the values assessment, the issue regards more specifically to understand better why the various institutional structures established to facilitate decisions-making of different kinds have resulted in weakened care for the values of nature. Such knowledge is important for strengthening humanity's capacity to make visions about sustainable and just futures come through.

[25] Certainly, species loss is happening all the time. There will always be some species that do not have the 'necessary capacity in their genes' to adapt to changes. From geological data, periods with mass extinction due to severe changes in the conditions for life on earth are documented. It is argued that we presently are in such a process (IPBES 2019).

Values in decision-making

This section discusses what types of values are important as well as conceivable given different types of decisions. It will specifically focus on how various contexts of decision-making favours certain values and hinders others to be expressed as the basis for making decisions. The analyses are, hence, based on the theory of human action and the role of institutions in that respect. The section will moreover be structured on the basis of the assessment-wide decision-making typology (see *Chapter 1*). This typology distinguishes between political, economic, and socio-cultural decision-making. Such decisions are made by different actors – political, economic and civil society actors. Their decisions are moreover impacted by the different types of institutions[26] established that influence their actions, interests and values as well as the powers they have to realize them. More specifically, political actors have rule-making power and define the institutions – named resource regimes in *Figure SM2.28* – that economic actors operate under. Political decisions are themselves governed by constitutional and collective choice rules also defined by political processes. Constitutional rules typically define broad values important for the society as well as basic rights of citizens including what powers political actors have in relation to its citizens. Collective choice rules regard how political decisions should be made. The resource regimes offer economic actors the rights to manage, use and possibly trade resources from nature producing usable goods/income but also waste (operational power). That happens given the characteristics of these resources and existing technologies and infra-structure. Both political and economic decisions are to a larger or lesser extent embedded within the wider social and cultural context of civil society. These different relations are captured in Figure SM2.28.

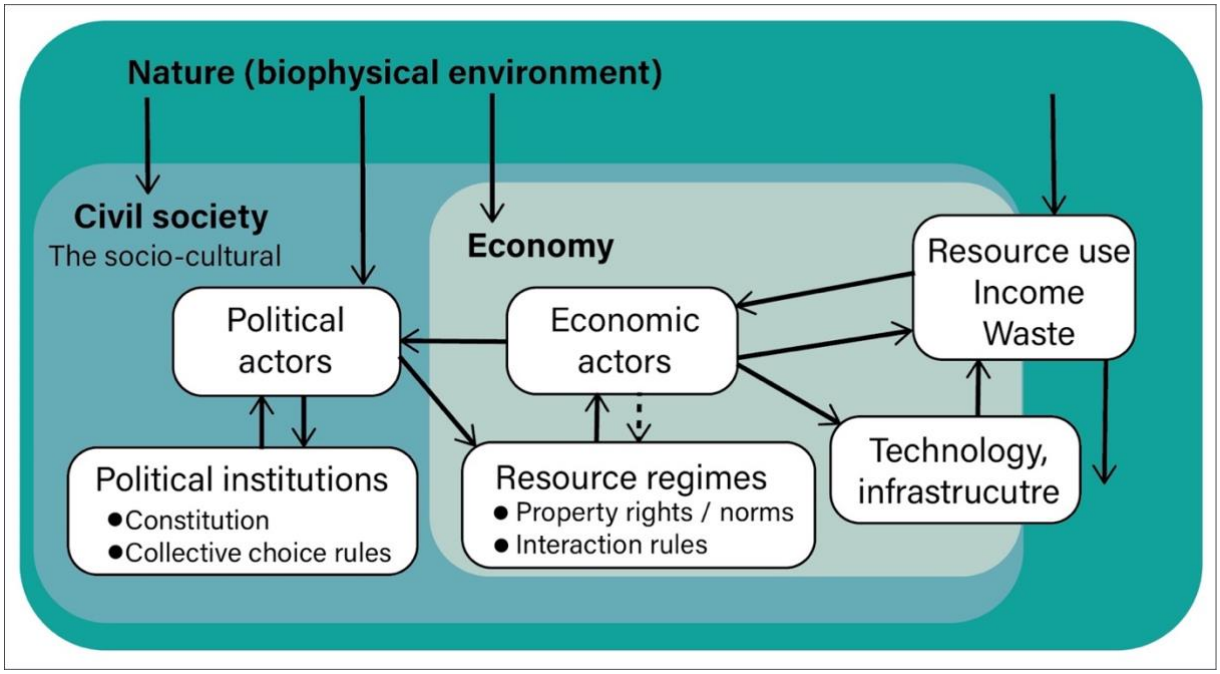

Figure 2.28 Decision-makers and decisions in context. Source: Vatn (2021) (translated).

[26] Institutions are in the values assement defined as 'conventions, norms and legal (formal) rules' of a society. Resource regimes include legal rules like property rights and rules for trade etc. - that is rules that demand an authority to protect them. Notably, economic actors may themselves form (business-)norms that are also important elements of the resource regime - cf. the dotted arrow.

The institutional structures described in Figure SM2.28 can be termed governance frameworks. They are case specific institutional framings of economic, political decision-making and socio-cultural processes of relevance to the governance of human-human and human-nature relationships. Values impact such processes and decisions in different ways. Each actor may base her/his actions on personal values. However, as outlined in *2.4.1.3*, values are often 'institutionalized'. They are implicit in the rules (institutions) for decision-making and/or the role that individual or collective decision-makers operate under. Hence, there are rules for what a politician, a CEO of a firm or a community leader are expected to do. These rules are defined to protect certain values underlying the kind of decisions involved. It defines what values and interests receive protection and how. Note also that the same person may play different roles. We are all citizens and in that way members of civil society. We are also all economic actors. That is necessary to sustain our lives. Finally, some of us are elected or otherwise recruited to roles as political actors. The expectations of what these different roles imply vary and mixing the role of an economic and a political actor is typically termed corruption. This fact illustrates that the rules – and hence which values are protected – vary across types of decision-making.

We start by looking at economic decision-making with its implications for the values of nature. One may argue that political and socio-cultural decision-making are the most fundamental as these forms of decision-making are important for the formulation of the conventions, norms and formal rules under which economic actors act. Still, it is through use of natural assets – i.e., economic decision-making – that we have a direct impact on nature. By using this order, we start by getting at terms with what motivates economic decisions and how the structures established for such decision-making influence the state of nature. Then we can discuss what challenges these decisions pose for political decision-making, and how they link to socio-cultural processes.

Economic decision-making

Economic decision-making regards what we produce and consume to sustain our lives. In that respect, it also includes investments and disinvestments in different assets, including natural assets. Production may be household based, community based (including not-for-profit organizations) or organized as private or public companies. In mainstream economics it is standard to assume that producers maximize profits and consumers maximize utility (e.g., Krugman and Wells, 2014; Mankiw and Taylor, 2014). The basic assumption is that economic actors are self-centered. Producers create commodities for sale to consumers through markets. Hence, the focus is dominantly on instrumental values. While this is meant to be a descriptive model of economic actors, profit maximization is also defended on a normative basis. Friedman (1970) famously argued that corporate leadership has the duty to maximise shareholder value/profits (see also Kraakman et al., 2009; Sjåfjell, 2011 on this).

Notably, mainstream production and consumption theory emphasize values that can be traded in markets – i.e., foremost instrumental values of a kind that can be commodified and valued in monetary terms. Regarding the production side, this is an understanding that is most relevant for the operation of corporations. In the literature on family-based economic activities (e.g., farming, handicraft, small industries), it is noted that these entities are often both production and consumption units, and that this duality influences decision-making. In certain contexts, production for one's own consumption dominates. However, even when trading products on local or international markets is

important, it has been shown that family-based production units may be anchored in values beyond the direct economic output. The literature emphasizes - for example - the importance of quality-of-life considerations. In the case of agriculture, also maintaining relational values like landscape qualities and NCP are found important (e.g., Gasson, 1973; Burton, 2004; Kvakkestad et al., 2015; Brown and Kothari, 2011; Dominguez et al., 2012; Herrera-Cabrera et al., 2018). Moreover, the so-called 'solidarity economy' (e.g., Obando 2009; Razeto 2010) departs from a self-centered approach, emphasizing the logic of reciprocity, cooperation and community.

At the same time, authors like Bowles (1998), Schachenmann (2006) and Farfán-Heredia et al. (2018) document how the integration of household production into markets may change which values become (implicitly) emphasized. It represents a shift from more personal and durable local interactions – i.e., those often associated with relational values – to more anonymous and short-lived relationships, influencing the balance between the short- and long-term, instrumental and relational values as well as implying a stronger differentiation between rich and poor. Bowles (1998) emphasizes especially how the role of reciprocity diminished, but also how markets reduce the immediate dependence on local resources and tend to erode local cooperation regarding their uses.

Another aspect is the possibility that trade offers to expand beyond local ecological limits. Imported inputs free stakeholders from local resource constraints, but at the same time increase environmental impact, as with intensive, industrial agriculture (Hester & Harrison, 2012; Mateo-Sagasta et al., 2017). So, access to larger markets makes it possible to expand production and increase income (instrumental value) but may concomitantly result in increased deterioration of local recipients – challenging certain instrumental as well as intrinsic and relational values attached to these. Industrialized agriculture is one among several examples.

Economic decision-making is anchored in separated units – be it firms, families or communities. Regarding this, two aspects are important to recognize. First, the impacts on the deterioration of nature varies substantially between actors - cf. large firms vs. individual households. Hence, the scale of the action is important. Second, following the argument above, actions of individual actors - large or small - sum up to scales that may be detrimental even at the level of the earth system. If the focus is only on the profits or utility of each decision-maker (instrumental values), such effects upon others may go unnoticed. Even if a decision-maker may care for nature's values on their individual property, effects beyond the property will still be problematic.

What does research say about the capacity of economic decision-makers to solve these problems themselves – to protect the diverse values of nature? The perspectives presented on this issue are varying quite a lot across the literature. Mainstream economists – e.g., Baumol and Oats (1988); Kolstad (2000); Tietenberg and Lewis (2019) – assume that firms when undertaking their activities may create externalities. These are understood as unintended effects of production that are not captured by markets and will not be accounted for by the individual economic actor. Kapp (1971) criticised the view that externalities were unintended. He argued that if one takes the mainstream theory of the firm seriously – with profit maximization (instrumental monetary values) as the institutionalized value perspective – this implies that businesses will try to minimize costs that could appear in the accounts. That can be obtained by being more effective in resource use as is also the mainstream view. Kapp went further and argued that costs for firms can be minimized by simply shifting them upon others. To the extent that they can 'get away with it', this is what should be

expected given the selfish actor of mainstream theory, and he illustrates his point by referring to smokestacks being built high and industry plants being located at riverbeds. A similar reasoning is developed by Martinez-Alier (2003), who analyses how environmental costs are especially shifted upon the poor.

Bromley (1991) offers a structural argument with analogous implications. He refers to mainstream welfare theory emphasizing that efficient outcomes – maximization of utility across society – is ensured when producers and consumers operate in a competitive environment. This requires a high number of firms. But the imperative to divide control over resources among atomistic agents is, at the same time, what creates coordination problems between firms. Atomization implies increased numbers of borders between economic agents, thereby magnifying transaction costs regarding side-effects, contributing to the generation of market externalities.

Despite these arguments, there is also a substantial literature emphasizing that firms may take on a responsibility to reduce or minimize their negative impacts on the values of nature. Carroll and Shabana (2010), Stahl and de Luque (2014) and Frynas and Yamahaki (2016) are among those highlighting that several firms engage in self-regulation of their social and environmental impacts. One important trend here regards the so-called corporate social responsibility where the focus is on the social and environmental responsibility that firms have. While the focus on this wider set of specific values comes as a response largely to pressures from external stakeholders – especially civil society organizations – Stahl and de Luque (2014) are among those arguing that such a broader value focus may resonate with employees. While incurring extra costs, it also tends to increase effort by the workforce due to enhanced identification with the firm. The net effect could even be enhanced profits. This argument is built on a complex understanding of what motivates workers. Their aims may go beyond maximizing wages.

At the same time, there is also research that questions the validity of the claims that corporate social responsibility has much effect. Bénabou and Tirole (2010) note that growth in bonuses to business leaders closely linked to the economic performance of the firm has expanded. This has been motivated by a need to ensure that leadership focuses on maximizing shareholder value. They argue that this increases the tendency to short-sightedness in firm operations. Parts of the literature on corporate social responsibility moreover critiques it as an instrument to simply legitimise businesses through "greenwashing" – that firms reveal information about their production methods and products that are not balanced or true with respect to environmental impacts. Many firms rather do so than making serious attempts to engage in minimizing environmental impacts/protect nature values (TerraChoice. 2010; Delmas and Burbano, 2011; Sjåfjell, 2011; Sneirson, 2011; Fleming et al., 2013; de Freitas Netto et al., 2020). Companies may engage in 'selective disclosure' as it is difficult for consumers to evaluate the quality of the information presented (Delmas and Burbano, 2011; Pizzetti et al., 2021).

Greenwashing has over time become quite exposed in the media and through civil society activism. Environmental NGOs have put much effort into uncovering such activities (King and Pearce, 2010; Marquis et al., 2016; Berrone et al., 2017). This has increased the risks involved in greenwashing and a burgeoning literature indicates that firms may actually not gain economically from engaging in such activities (Walker and Wan, 2012; Gatti et al., 2019). It may rather have a negative effect on profits.

Another trend that may be seen as based on a more sincere will to engage in the protection of the values of nature regards the development of so-called eco-social or sustainable businesses - e.g.,

Johanisova and Franková (2017); Muñoz and Cohen (2017). Obtaining environmental goals/ensuring environmental sustainability are explicit elements of their mission. To do so, they accept reduced profits. These firms do, however, often struggle to survive and many face problems with acquiring funding.

Common property is another way to organize productive activities. Such arrangements make it possible for communities to handle interdependencies regarding resource use between different users. A pasture, forest or fishery may be utilised by many people, and the risk of deterioration is prevalent. In such situations, community management systems have demonstrated the capacity to avoid the fabled 'tragedy of the commons'[27] (Agrawal, 2001; Bromley, 1991; Ostrom, 1990, 2005), and there are several examples where IPLC-based nature management has proved to be an effective way to protect biodiversity - also going beyond its instrumental value (e.g., Cordero et al., 2018; Eghenter, 2018; Herrera-Cabrera et al., 2018; Singh, 2013). Internal regulations of resource use are apparently key to success. However, local management is not a 'silver bullet', as there are also several examples of failure (Agrawal, 2001; Ostrom, 2005). Indigenous peoples and local communities often face institutional impediments to exercise their self-determination and full engagement in natural resource management and decision-making. One impediment regards the engrained colonial framings of resource management and disconnects between policy-making, scientific and indigenous knowledge. For example, in the Bolivia-Brazil transboundary region of the Amazon basin, local fishers have developed their own informal rules and decision-making processes regarding fisheries management and commercialization, given the inconsistencies between both countries' regulatory frameworks, in which authorities fail to include local fishing communities and ILK in decision-making. In addition, state agencies responsible for fisheries management in the region largely disregard scientific information in the fishery governance (Doria et al. 2021). These various disconnects between science, policy-making and local knowledge, has resulted in increased conflict and vulnerability to external threats such as infrastructure development, climate change, and changes in policies.

Moving to consumers, the literature observes that some purchase eco-friendly products. If that could be scaled up, positive impacts on environmental values could be strong. Consumer boycotts have been successful (e.g., Garrett, 1987; Klooster, 2006; Skjærseth & Skodvin, 2001) but in line with the above observation on greenwashing, they seem largely dependent on collective action often initiated by environmental NGOs (e.g., Child and Tsai, 2005; Haufler, 2009; Klooster, 2006). Again, the pervasive information asymmetries feature as important. For example, studies have shown that consumers may be well-intended, but are often ill informed (Heiskanen, 2005). Labelling systems could be helpful in that respect, but its success seems varied (Bishop et al., 2008; Horne, 2009; Ward & Phillips, 2009; Atkinson and Kim, 2015; Vogt 2019). Moreover, a person must be strongly motivated to act pro-environmentally as creating any measurable effects depends on many consumers acting in concert. Here, free-rider problems again arise (Delacote, 2009), and the greater success of organized boycotts may be explained by its ability to increase not only visibility, but also the belief that actions by each single individual may be effective. Developments in the forest sector offer further insights into this issue. In this case, NGOs have mainly focused on pushing the processing industry

[27] Ostrom (1990) shows that Hardin's concept of 'tragedy of the commons' (in the meaning of common property) (Hardin 1967) was rather a 'tragedy of open access'.

towards buying certified timber (Bernstein and Cashore, 2004; Pattberg, 2005). This has been more effective than focusing on the end-users.

The fact that it is demanding to change consumer behaviour is supported by the observation that individuals tend to largely do what others in their social circles do. Practice theory (e.g., Schatzki et al., 2005; Røpke, 2009; Welch & Warde, 2015) shows how consumption forms identities and becomes part of institutionalised practices – i.e., practices that characterises groups of people as well as whole cultures. Many societies are portrayed as "consumerist". The role consumption plays in forming identities in such societies has been influenced to a large extent by marketing strategies successfully utilizing our need to identify with a group (Bakan, 2011; Hooley et al., 2005; Spash and Dobernig, 2017).

As emphasized in the main text, norms may be important 'measures' to overcome the impulse to free-ride. They may play a key role in balancing between the various values involved, such as those related to individual consumption, ensuring equal opportunity across time and space, maintaining environmental integrity, etc. In *Chapter 2* it is emphasized that people whose human-nature relationships strongly incorporate nature (e.g., *living in* and *as* nature) have developed worldviews and practices emphasizing ecological balance (Benzig, 1998; Jones et al., 2010; Song, 2008). Molina Bedoya (2015) illustrates how the *Buen vivir* concept in various Andean cultures – emphasizing subsistence, care and reciprocity – supports 'living well' based on balanced resource use and resisting expansion/unlimited growth. This has motivated scholarly work and new social movements beyond Andean contexts, such as the "De-growth" movement in Europe (Paulson 2017).

While the above shows that certain efforts to reduce negative effects on nature and NCP at the level of the individual actors or firms have been successful, the trends towards increased deterioration of nature's values indicate that the overall effects of this are far too weak. One reason for this is that economic expansion is still strong, implying steady increase in the use of materials and the creation of waste (e.g., Jackson 2017; Hickel and Kallis, 2020; Gómez-Baggethun 2020). The understanding of the causes of environmental degradation demands an understanding of the sum-effects of decisions made by a vast number of economic actors. Emission levels and levels of land conversion – even if they seem locally acceptable – sums up to non-acceptable levels at regional and global scales. In relation to this, the concept of telecouplings (i.e., socioeconomic and environmental interactions between distant coupled human and natural systems, Hull & Liu, 2018) is of importance in a world of globalised commodity chains. This perspective emphasizes interdependencies across space and time, whereby economic actions at one place may influence conditions far away or where changes in one sector (e.g., fisheries) may influence another (e.g., the prices of wheat). Interests of different actors vary along the involved commodity chains while the conflicts involved may be diffused across time and space.

Added to this, we should also note that even if we make heroic assumptions implying that firms disclose only true information about their products, consumers care and are well informed about the dispersed effects along the stages of commodity chains, this may still not resolve the problems. There will nevertheless be a skewed focus towards emphasis on values that can be traded. Firms operate in an institutional structure where they, to be able to survive and make profits, must fight for increasing their sales. An overall effect of this is increased focus across society on values that can be traded. Other values – other aspects of what creates a good quality of life – become less visible in the 'fight'

for our attention. Hence, the challenges faced seem to demand more fundamental changes in the institutions that govern economic decision-making. That is an issue for political decision-making.

Political decision-making

A key element of political decision-making regards defining the governance structures of a society. This implies outlining who holds the rights/responsibilities to make decisions at various levels of society. The power to create these rules may rest in the authority of the state or with customary authorities (e.g., Baland & Platteau, 1996; North, 1981; Turner, 2011). In the context of the *values assessment* the focus is foremost on political decision-making as defining and protecting rights regarding access to and control over natural assets and NCP. This includes also a capacity and responsibility to define conditions for exercising these rights – regulating side-effects/externalities, for example through legal or economic instruments. Hence, political decision-makers have the power to regulate environmental impacts of economic activity. In these processes, state/public actors dominate, while economic and civil society actors also have impact through negotiations, lobbying, voting or mobilizing citizen protests (Kashwan et al., 2019).

What broad values motivate the actions of political actors? Also, in this case, parts of the literature emphasize self-interest. However, what the self-interest is portrayed to be, is more complex than in the case of economic actors. For political actors – both politicians and administrators – self-interest may regard their personal economic interest, maximizing votes and/or protecting the interest of the administration they are leading or are part of (e.g., increasing its budgets). So, while there may be market failures, there is also policy failure (see Niskanen 1971, Buchanan 1978 and Dearlove 1989, which are formative papers of this perspective). While this literature does not engage with despotism and dictatorship, often such government structures are understood as a form of selfishness aimed at accumulating power and wealth (Tofte Thorsen 2020). Although dictatorships often secure power through repression and violence, they can also have citizen support (Guriev and Treisman 2020).

A contrasting perspective flows from a literature that understands policy-making to be about the 'common good'. This literature makes a distinction between people as consumers and citizens and looks at the political process not least as forming what it means to be a citizen, a politician or an administrator (e.g., March and Olsen 1995). Politicians may have different visions of the common good, and on what interests and values are important to develop and protect (e.g., Francescato et al. 2017). However, what the politicians and administrators are expected to do, is to abide by the mandate of being a representative. The concept of corruption draws the line between what is and what is not acceptable behaviour. Policy processes are moreover understood as a dialogue between politicians and the citizen – a process that may change both.

Between the policy failure and common goods literature, we find what is often termed the liberal or 'pluralist' position. According to this view, different political actors compete for power and, given the interests they represent, bargain with other actors and look for opportunities to make coalitions when necessary to advance their position (e.g., Dahl 1989). While groups have unequal bargaining power, this tradition tends to think that over time, and through different coalitions, no interest will be left out. This is again very different from the Marxist tradition which inter alia focuses on the state as representing the interests of the economically dominant classes (e.g., Miliband 1969), or favours the

interests of the capitalist class, not directly, but indirectly as this class control most of the productive resources of a society (Poulantzas 1978).

The above positions span a wide array of interpretations. The following text is built on the assumption that societies – through political processes – are able to formulate policies that can take collective issues and interests well into account. It is presumed that it is possible through political decision-making to make structural changes as a response to e.g., the collective choice issues/'free-riding' problems observed that endangers the future capacity and integrity of our physical environments. This implies also that actors involved are able to acknowledge the different existing worldviews, interests and values that people hold – not least those having a weak say in today's political processes (Jacobs et al. 2020). It is foremost through political decision-making, sometimes mobilized through civil society movements (e.g., Temper et al. 2018), that it is possible to formulate changes in the ramifications for economic decision-making so that it becomes possible to turn present trends and increase the ability to take plural broad and specific values of nature into account. Certainly, this is demanding, and societies often fail – not least because other values are prioritized due to uneven power relationships. The point is still that collective problems demand collective responses.

While much of the literature in political science is focused on policy making as maneuvering in a landscape of interest conflicts, authors as different as Easton (1965), Stewart (2009) and Fukumoto and Bozeman (2019) emphasize that politics is still foremost value based. Easton is famous for the expression that politics is 'the authoritative allocation of value'. Noting that value conflicts are important in the policy arena, Stewart (2009:2) emphasizes that "Whatever forces go into the production of public policy, the result is always a compromise between different value positions". When formulating broad values or goals for a society and issuing concrete policies – be it about institutional changes aimed at enhancing economic growth, protecting an ecosystem, regulating pollution – certain (types of) values are chosen at the expense of others. Similarly, budgeting is about prioritizing some values over others (Norton and Elson, 2002)

The literature regarding key political values emphasizes what in the values assessment is called broad values. Democracy is emphasized as a fundamental political value – often taken as a given, but also contested as to its position, meaning and practice (e.g., Laidi & Costopolous 2002, McFaul 2004; Hoover et al. 2011; Fuchs & Klingemann 2019). Going beyond this level, authors emphasize sets of broad values that they find to stand out. Meynhardt (2009) distinguishes, for example, between four different public value dimensions being 'moral-ethical', 'hedonistic-esthetical', 'utilitarian-instrumental' and 'political-social'. Stewart (2009) refers to political decision-making as operating in spaces defined by contradictory pairs of - what in the values assessment is called broad values. She especially emphasizes fairness vs. efficiency and growth vs. greenness. Values are prominent in policy debates (Neiman et al. 2015) – both as emphasizing aspects of political programs and as legitimising them. Stewart (2009) is moreover among the authors that emphasize the role of values when forming legal and administrative structures.

The different ministries with their agencies are typically formed around a key set of values, interests and knowledge (e.g., Thomas 1997; Daugbjerg 1998; Nilson 2005; Movik and Stokke 2015; Sjölander-Lindqvist et al. 2020). By defining who has the power to decide and what knowledge and criteria should be emphasized when deciding, one emphasizes what values come to the fore. This makes values less visible, but not less important (c.f. also a discussion of this in *2.4.1.3*).

Regarding nature and NCP values, policies play a role at different levels. Obviously, policy makers influence the conditions for economic activities through the formulation of general economic policies. That regards what types of property rights are favored, policies of finance, how and what technological development is catered for, what kind of trade policies are formulated etc. Economic growth has been a dominant goal underlying economic policies nationally and globally (e.g., Purdey 2009; Coyle 2014; Schmelzer 2015). As the negative impacts of this development on environmental values has surfaced, policies have been instituted to counter some of these. In later sections annex (*Economic growth as the core value underlying economic policy* and *Environmental policy*), this value conflict is picked up again – the growth vs. greenness (sustainability) tension as emphasized by Stewart.

Socio-cultural decision-making

Socio-cultural decision-making regards processes in civil society that inform, maintain and change the socio-cultural identity of individuals, groups and societies. It includes defining what are considered fundamental values, emphasizing relations among people as well as between people and nature (Comberti et al. 2015; Chan et al. 2016; see also *2.3.2*). The socio-cultural context plays a basic role in the forming of any society. As a type of decision-making, it is often implicit in processes of creating habits, practices, and traditions as well as part of formal rules and procedures (e.g., Pröpper and Haupts 2014; Schill et al. 2019). We encounter processes that are dispersed where maintenance and change are ongoing developments without clearly articulated or defined decisions being made. While the cultural dimension - i.e., the act of meaning-making (Pröpper and Haupts 2014) - is central in socio-cultural decision-making, values and preferences can also be expressed and studied as individual preferences that influence decision-making like sense of place (Masterson et al. 2017).

Through creating identity, socio-cultural processes shape what are important cultural aspects of nature in the sense of relational as well as intrinsic and instrumental values (Chan et al. 2016, 2018, West et al. 2020). This way it influences what is seen as acceptable political processes as well as what can be viewed as a decent livelihood or not. Still, neither political nor economic decision-making is the primary focus.

Two aspects of the socio-cultural dimension will be specifically emphasized below. The first regards the relation between civil society/socio-cultural decision-making and economic and political decision-making. The second regards the role that socio-cultural processes play in forming values and 'balancing' instrumental, relational and intrinsic values as expressions of individual and cultural identity.

Historically, the economy was more directly embedded in the socio-cultural context, while over time – not least through the development of separated economic institutions like impersonal markets – the relationship has changed (Habermas 1984). In the age of mass-consumerism, the economy heavily influences back on the socio-cultural. Civil society actors may align with the value prioritization of economic actors (e.g., Stutzer et al., 2021) and we observe how consumptive activities have become very important for the forming of our identities (e.g., Ahuvia 2005; Ruvio and Belk 2013). This has changed the balance between living *from*, *with*, *in* and *as* nature – albeit in different ways and to a different degree across the globe - as well as the recognition and weight of the socio-cultural dimension.

So, while the economic 'logic' as institutionalised in markets and dominant property rights structures, have impacted heavily on the socio-cultural context, the latter has also 'fought back' and emerged in other foras. This has already been illustrated by the examples of civil society/NGO reactions to unsustainable production procedures (see section *Economic decision-making* of this annex). Other examples include local resistance to mining and other projects that have negative impacts on local values - relational, intrinsic as well as some instrumental values – (cf. Temper et al. 2018) and the Niyamgiri case as documented in the main text of the chapter. These protests have put pressure on political actors to protect local interests and rights and raised issues about what are legitimate procedures regarding the establishment of such projects and thus the weight of local vs. externally imposed priorities and values.

Regarding the second aspect - the role of the socio-cultural in defining what are important values to us - may be seen as the most fundamental. Shared relational values are generally embedded in worldviews or life frames expressing human-nature relationships. In settings in which humans view themselves as *living with*, *in* or *as* nature (rather than *from*), socio-cultural decision-making may be an explicit decision-making category, where e.g., cultural identity related to a particular place is central to the discussions. Decision-making in indigenous communities, based on heritage, honouring relationship to place or territory, or sacred natural sites, exemplifies decisions where the socio-environmental context is explicit (Gavin et al. 2015, Sterling et al. 2017, Dacks et al. 2019). In the associated governance systems, socio-cultural decision-making may overrule economically motivated decisions. It is important to note that such decision making is also embedding the sustainable use of nature and intrinsic values - not only relational values (Dawson et al. 2021).

Furthermore, the importance of identity and biocultural relationships, including people as 'stewards' of nature, go beyond IPLC (Andersson et al. 2014, Enqvist et al. 2018, Folke et al. 2019). It can also play a critical role in civic engagement to protect or restore nature in urban settings (Connolly et al. 2013, McMillen et al. 2019, Murphy et al. 2019). Here, decisions about mobilization of resources or specific actions, including responses to change, may be motivated by values related to personal and collective sense of place, including place attachment and place meanings (Marshall et al. 2012, Masterson et al. 2017; Raymond et al. 2017; Manzo and Devine-Wright 2021). In much of the literature, the importance of locality - cf. the life frame of living in - is emphasized in connection with socio-cultural decision-making and human-nature relations (Pröpper and Haupts 2014, Comberti et al. 2015, Masterson et al. 2017, Gavin et al. 2018)[28].

While it is useful for analytical purposes to distinguish between economic, political and socio-cultural decision-making, these categories are often highly intertwined. The literature on social-ecological systems emphasizes decision-making in the interface between human and biophysical subsystems, framed by institutions and wider worldviews (Berkes and Folke 1998, Berkes et al. 2003, Liu et al. 2007, Ostrom 2009). Schluter et al. (2019) add social-ecological action situations to Ostrom's framework, including practical decisions about cultivation and harvesting, cultural activities and ecological monitoring. Furthermore, the 'relational turn' in the analysis of values and decision making calls for a view of the social-ecological as inherently inseparable, to better describe the intertwined system's behaviour and human agency based on human-nature relationships (Mancilla García et al. 2020, West et al. 2020).

[28] Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278)

The way societies frame decision-making and how such frames are institutionalised, have strong implications for which kinds of human-nature values that are voiced, heard and included in decision-making. Schill et al. (2019) illustrate how a narrow framing of the rationality of human behaviour (i.e., as *Homo economicus*), misinterprets human behaviours as embedded in and co-evolving with cultural and environmental values and experiences.

In conclusion, socio-cultural decision-making may have strong bearing on economic and political decision-making, even if often implicit or underlying. Still, values of nature are in many settings marginalised and/or made invisible through prioritising economic values (Comberti et al. 2015, Chan et al. 2018, West et al. 2020). However, nature's values matter for the ways decision-making is institutionalised across different levels in society and in different settings, and also frame protests against or actions to change dominating structures (Connolly et al 2013; Gavin et al 2018; Sterling et al. 2017, Masterson et al. 2017).

Economic growth as the core value underlying economic policy

From the above it is clear that economic values have been given increased priority over time, in both worldviews and much of our institution building. An underlying perspective or broad value in that process has been economic growth, and one may ask when and how it rose to become so dominant. It seems to have started with the great depression of the 1930s and the demands the second world war put on planning the use of resources. So, it did not start as a goal or overarching value, but grew out of the increased state engagement in the economy following these events as they demanded better knowledge of the economy's productive capacity (Speich 2008). Hence, systems of government statistics were developed resulting in the concepts of gross and net domestic product (GDP and NDP) (Tooze 1998). This made the economy a manageable entity in a certain sense. Both John M. Keynes and Simon Kuznets played an important role in this process, transferring the methods of firm bookkeeping to the entire economy. There was a big debate about what elements should be included – e.g., whether the values produced outside of markets like unpaid work in households should be part of what was measured belonging to 'the economy'. In the end, one settled on including only market values (Schmelzer 2015). Hence, a focus on instrumental values was already present from the start, moreover only a subset of these.

The focus in the years after the second world war was to rebuild the economy. While many economists and politicians feared a new recession, growth sustained and the idea of 'endless growth' was gradually forming as an ambition. According to Schmelzer (2015) the goal of economic growth was first stated as a public aim in the US in the late 1940s and soon spread, not least in the western hemisphere. According to Schmelzer (ibid.), the Secretary-General of the OEEC[29], later OECD Robert Marjolin noted this 'breakthrough' in his memoirs stating that "Sustained and as rapid as possible 'growth' was the supreme objective, to which [other policy objectives] had to be subordinated" (as cited in Schmelzer, ibid:266). Also, the communist block came to focus on growth as the essential goal for its economic planning, and it was proclaimed that it would grow its economy to outcompete capitalism (Robertson 2008).

[29] The Organization of European Economic Co-operation, established foremost to manage the Marshall Plan

It is notable that in the post-war period the so-called Bretton Woods organizations – i.e., the International Monetary Fund (IMF) and the World Bank – were established. One important aim was to ensure fixed exchange rates between the national currencies to establish a better basis for expanding international trade (Steil 2013) and shortly after the General Agreement on Tariffs and Trade (GATT) was created.

Schmelzer (2015) argues that economic growth became a panacea – a solution to a wide set of challenges and the way to protect a wide set of values. It could ensure increased welfare among people – both through increases in individual income and through expanding the basis for tax income for states to finance welfare programs. It was even seen as a solution to the environmental problems appearing with increased seriousness from the 1960s and onwards – e.g., the environmental Kuznets curve that portrayed that when GDP per capita reached a certain level, aggregate environmental problems would slow down (for example, Beckerman 1992). Taken together, what we observe is a development from GDP as a technical device to measure the size of the economy, to create the idea that growth, as so measured, should be the dominant aim - the broad value - underpinning economic policy across countries and cultures.

Already from the start, it has been questioned whether economic growth has the 'universal' capacity to enhance welfare – a good quality of life for all. Already one of the founders of the concept of GDP – Simon Kuznets – warned the US Congress that the "welfare of a nation can scarcely be inferred from a measurement of national income" (Kuznets, 1934). This argument has been reiterated in different forms and several authors have – as an example – argued that beyond a certain level of per capita GDP, increased production as thus measured is hardly welfare enhancing (e.g., Diener and Biswas-Diener 2002; Kasser et al. 2004; Layard 2005; Kallis 2011; Jackson 2017). Dasgupta (2021) is among those pointing out that GDP as a measure of flow is not an adequate measure of wealth. At the same time, it is observed that the fruits of economic growth have not reached everybody. Income disparities are actually increasing (e.g., Martinez-Alier 2003; UNDP 2015; Piketty 2020).

What is not much disputed, is the historical impact of economic growth on the use of natural resources. Data covering the 20th century shows that GDP growth is followed by a growth also in material use, while at a somewhat lower pace (Krausmann 2017). Even if the concept of decoupling came to feature in the literature towards the end of the century – i.e., that the growth in GDP could happen with reduced use of natural resources – the trend actually turned the opposite way. Hence, the period 1990-2013 shows an equal increase in global GDP and global material use. Both have almost doubled (Hickel and Kallis 2020; see also Jackson 2017). Notably, the sub-category fossil fuels has increased by a lower rate, so here one may talk of relative decoupling (Hickel and Kallis, 2020)

Countries play a different role in this development, both because of differences in resource base, income levels, political systems and cultures. Natural resources play an important role in the economy of any country. Nature is fundamental for all of us as the basis for instrumental, relational and intrinsic values. Regarding the former, there are, however, differences between net exporters and net importers of materials and energy (Dorninger et al. 2021). Some countries are more 'extractivist' than others, and they have to carry the immediate effects of land use changes and pollution following natural resource-based activities wherever they occur. Generally, natural resources play a relatively stronger role in the economy of developing countries as opposed to developed countries (World Bank n.y.).

The debate on extractivism does not only focus on environmental impacts. It also looks at whether extracting serves the creation of a good quality of life for all. This debate includes emphasis on 'resource curse issues'[30] (e.g., Cori and Monni 2015), unequal distribution of net gains (e.g., Ayelazuno 2014; Bebbington et al. 2018; Smart 2020), resource grabbing (e.g., Ayelazuno 2014) and corruption (e.g., Bashirov 2021). Even in the case of so-called neo-extractivism – the policy of governments especially in Latin-America - that were elected on programs focusing on distributional matters and reduced dependency on extractive sectors – the literature tends to conclude that the success has been meager on both accounts (e.g., Veltmeyer 2013; Brand et al. 2016). Local protests are still manifest. The literature observes variations between countries, though (e.g., Cordoba et al. 2017). This is a complex story, where increased prices on natural resources from about 2000 and the role of foreign investments have played a significant role.

The literature referred to above shows that policies vary a lot across countries where natural resource extractions play a key role. Actually, one can identify examples representing all the models of political action briefly explained in the section *Political decision-making*, above. Many examples of political and economic elites focusing mainly on their own interests when facilitating extractive policies were found. There are, however, also governments that reflect more democratic ideals and some reflect ideas like *buen vivir* that at least in some cases go beyond mere political rhetoric (e.g., Broad and Fisher-Mackey 2017).

We also observe that the issues faced are not only about conflicts between instrumental, relational and intrinsic values of nature. Good quality of life is important for everybody, and here instrumental values play a significant role. From that perspective, the issue is as much about what and whose instrumental values are afforded as well as how humanity is able to balance between the demands of the instrumental, the relational and the intrinsic.

As already noted, political action – including actions by civil society – seems important in that respect. Given the kind of problems we face, collective action is pivotal for creating the conditions for maintaining the integrity of nature, the production of NCP and building systems enhancing equality and social-ecological resilience. Such action seems important for handling well the 'free-rider' dilemmas faced and for the development of strategies for sustainability.

Environmental policy

The negative effects of economic expansion became gradually visible from the early 1960s and the field of environmental policy became established from around 1970. Ministries for the environment and various national agencies were set up in many countries. As environmental problems do not know any national borders, the international dimension became focused early on. The Stockholm Conference on the Human Environment in 1972 marked the start of an international process of bringing the environmental challenges to the fore. The establishment of the UN Environmental Programme (UNEP) was one of the outcomes (Vatn 2015).

[30] The observation that (some) countries with an abundance of natural resources have weaker economic growth and are more undemocratic than countries with less natural resources

Two issues are of interest. The first regards what perspectives underlined the development of environmental policies as mainly appearing since 1970. The second regards what regulations that grew out of these perspectives. The Stockholm Conference happened at a time when the possibility of perpetuated economic growth started to be questioned and the issue of physical limits to growth became emphasized. In the final document from the conference, there was strong focus on public planning (United Nations 1972). In the so-called Cocoyoc Declaration two years later – coming out of a meeting organized by UNEP and UNCTAD[31] – the following was stated: "The task of a statemanship is thus to attempt to guide the nations, with all their differences in interest, power and fortune, towards a new system more capable of meeting the "inner limits of" basic human needs for all the world's people and of doing so without violating the outer limits of the planet's resources and environment'' (UNEP/UNCTAD 1974:4).

According to Goméz-Baggethun and Naredo (2015) this perspective did not gain much support. They state that it was *de facto* vetoed by the US. Instead, the understanding shifted to seeing growth as the solution even to environmental problems. According to the much celebrated Brundtland commission, poverty was seen as an important cause of the problems (WCED 1987)[32]. The perspective that there is no conflict between economic growth and environmental status has further been manifested in the UN conferences on environment and development, in Rio de Janeiro in 1992, Johannesburg 2002 and in the so-called Rio+20 in 2012. Rather, the emphasis has been on facilitating economic growth and free trade as a means to ensure sustainability. As an example, the declaration from Rio+20 states "We also reaffirm the need to achieve sustainable development by promoting sustained, inclusive and equitable economic growth, creating greater opportunities for all, reducing inequalities…" (UN 2012:1). Policies for biodiversity and sustainability policies dominantly advocate economic growth (Otero et al. 2020). Hence, the win-win paradigm prevails.

Especially since around 1970, a series of specific policies has been put in place to reduce the negative impacts of industrialization and economic expansion on environmental values. There were some initiatives that date further back. These were mainly focused on nature/species conservation – e.g., the establishment of national parks and a few international conventions on species production – especially those being in danger of over-harvesting (Chasek and Downie, 2020). What is new from the 1970s and onwards is a larger focus on systemic challenges. Pollution of water and air becomes a focus both nationally and internationally. Loss of species and ecosystems is observed to increase at alarming rates. This results in a series of national and international initiatives, not least from the early 1970s and through much of the 1990s. Chazek and Downie (2020) state that altogether about 900 international agreements have been developed. Examples include:

- 1971: The Ramsar Convention on Wetlands of International importance
- 1973: The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

[31] The United Nations Conference on Trade and Development

[32] Much of the argument has been around the role of poverty in causing deforestation (e.g., Cropper and Griffits 1994; Ranjan and Upadhayay 1999). While a contentious issue, there is an emerging consensus that other drivers, such as commercial logging and agriculture are far more important (Geist and Lambin 2002; Curtis et al. 2018). Indeed, two meta-analyses (Atmadja and Sills 2005; Busch and Ferretti-Gallon 2017) conclude that poverty is not a driver of deforestation. The latter source states that poverty is consistently associated with lower deforestation, while it is opposite for population growth.

- 1973: The International Convention for the Prevention of Pollution from ships (MARPOL)
- 1979: The Convention on Long-Range Transboundary Air Pollution (LRTAP)
- 1982: The UN Convention on the Law of the Sea (UNCLOS)
- 1984: The International Tropical Timber Agreement (ITTA)
- 1985: The Helsinki Protocol on SO_2 (under LRTAP)
- 1987: The Montreal Protocol on Substances that Deplete the Ozone Layer
- 1988: The Sofia Protocol on NO_x (under LRTAP)
- 1989: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- 1991: The Geneva Protocol on Volatile Organic Compounds (under LRTAP)
- 1992: The UN Framework Concentration on Climate Change (UNFCCC)
- 1992: The Convention on Biological Diversity (CBD)
- 1997: The Kyoto Protocol to the UNFCCC
- 1998 The Århus Protocol on Heavy Metals and Persistent Organic Pollutants (under LRTAP)[33]
- 2000: The Cartagena protocol on Biosafety (under the CBD)
- 2003: The International Treaty on Plant Genetic Resources for Food and Agriculture
- 2010: The Aichi Biodiversity Targets under the CBD
- 2015: The Paris Agreement to the UNFCCC

(for details see Vatn 2015; Chasek and Downie 2020)

Also, a number of more regional treatises have been adopted. While the international and regional agreements have resulted in various national policies – it is at this level practical policies are instituted – there are certainly a lot of purely national and local initiatives that have been taken, too.

The literature distinguishes between three main strategies and discourses presently emphasized regarding how to put concrete policies in place to protect nature values. First, the 'market liberalist discourse' emphasizes the self-correcting capacities of markets (e.g., Coase, 1960). It has played an important role in motivating restricted state interventions. This strategy demands clear definitions of rights and low transaction costs to be effective. It therefore acknowledges the need for a state (third-person authority) to decide on rights (e.g., whether they should be with the polluter or the victims of pollution).

High levels of transaction costs, as well as persistent free-rider problems have been arguments for a second strategy that expands the role of state regulations. This strategy emphasizes use of legal regulations, economic instruments (e.g., emission taxes) and public information programs. The use of economic instruments has long been favoured by many economists (Thomas and Callan, 2010; Kolstad, 2000; Tietenberg & Lewis, 2019) and has strengthened its position in the policy realm (e.g., the focus on the "green economy" (UNEP, 2011). Concepts like tradable carbon emission quotas (Ellerman et al., 2010; Hansjürgens, 2005) and payments for ecosystem services (Pascual et al., 2010;

[33] All protocols under the LRTAP were integrated into the overarching Gothenburg Protocol in 1999

Wunder et al., 2008) are all part of this strategy, somewhat blurring the distinction with the liberalist market strategy.

While the above-mentioned discourses are largely based on economic growth and the possibility of win-win solutions, there is a third discourse emphasizing "the limits of win-win strategies". This discourse calls for more deep transformation. New concepts have emerged like "civic environmentalism" (Bäckstrand & Lövbrand, 2006), "de-growth" and "environmentalism of the poor and indigenous people" (Kallis, 2011; Martínez-Alier, 2009; Otero et al., 2020), de-emphasizing the role of free markets and the focus on exponential economic growth, and emphasizing place-based circular economies (such as bioeconomy), as well as a greater role of communities in resource management.[34]

It is notable that the establishment of the international treaties as well as national policies – especially of the second type mentioned above – has been met with opposition from not least the industry. However, the trend is somewhat shifting from pure opposition in the earlier periods towards being more about ensuring a level playing field (Vatn 2015).

While international and national treaties and policies are instituted to try to overcome the various types of free-rider issues involved, they are often weak both in their formulations as well as their realizations. The announced reductions of greenhouse gases points towards a temperature at the end of the century that is rather in the order of 3.0 and not 1.5/2.0 that is the aim of the Paris agreement on Climate Change (Rogelj et al. 2016). IPBES (2019) documents a weak realization of the Aichi targets regarding biodiversity protection – especially those regarding underlying drivers.

There are several reasons for this. Environmental regulations generally do not engage with the drivers. They rather focus on the effects. The institutions established to foster market expansion, international trade and economic expansion are generally left unchanged. Rather what we observe is a gradual change to strengthen these forces (e.g., liberalizing trade and financial business, the investor-state dispute settlements, e.g., Bronkers 2015; Pelc 2017). As emphasized in section *The basic challenge of environmental decision-making* (above), the literature in ecological economics documents that any economic activity will demand physical resources and that what is used inevitably ends as waste that will be returned to the environment. This seems not to be well acknowledged when formulating policies for growth. Important effects on the environment take time to manifest themselves. Then when they (by necessity) appear, long debates typically occur about what caused the problem, who is responsible and what are acceptable ways of handling the issues. At this stage, a lot of interests - as indicated above - are vested in the *status quo* and will oppose regulations (Union of Concerned Scientists 2007; Vatn 2015). It is therefore notable that a 'grow first – regulate afterwards' way of doing policies is structurally very problematic. It systematically produces interests against protecting the environmental values that even may be of fundamental importance for these very same interests in the longer run. Moreover, in a natural world of tipping points, the delays caused for action are dangerous. We risk passing such points long before problems are observed, understood and policies come into place. Climate change seems a good illustration of this problem. Taking a more proactive

[34] See also *Chapter 5* for a more elaborate discussion of these issues

role – accepting that any economic activity will create environmental impacts – it can be possible to treat the issues we face more up-front and we are able to reduce or even avoid important risks.

References

2nd Session. US Government Printing Office, Washington.
Agrawal, A. (2001). Common property institutions and sustainable governance of resources. World Development, 29(10): 1649–72.
Ahuvia, A.C. (2005). Beyond the extended self: loved objects and consumers' identity narratives. Journal of Consumer Research, 32(1):171–84.
Andersson E, Barthel S, Borgström S, Colding J, Elmqvist T, Folke C, Gren Å. (2014). Reconnecting cities to the biosphere: Stewardship of green infrastructure and urban ecosystem services. Ambio 43:445–453.
Atkinson, L. and Y. Kim. (2015). "I Drink It Anyway and I Know I Shouldn't": Understanding Green Consumers' Positive Evaluations of Norm-violating Non-green Products and Misleading Green Advertising, Environmental Communication, 9:1, 37-57, DOI:10.1080/17524032.2014.932817
Atmadja, S.S and E.O. Sills. (2005). Looking for a win-win situation: a meta-analysis of deforestation and poverty. In Chang, J.S. and M.A. Dunn (eds): Forestry: Economics and Environment Proceedings of the Southern Forest Economics Workshop, pp. 112-125. https://www.isfre.msstate.edu/docs/2005_proceedings.pdf
Ayelazuno, J.A. (2014). The 'new extractivism' in Ghana: A critical review of its development prospects. The Extractive Industries and Society, 1:292–302. http://dx.doi.org/10.1016/j.exis.2014.04.008
Bäckstrand, K. and E. Lövbrand. (2006). Planting trees to mitigate climate change: contested discourses of ecological modernization, green governmentality and civic environ-mentalism. Global Environmental Politics, 6(1): 50–75.
Bakan, J. (2011). Childhood under Siege: How Gig Business Ruthlessly Target Children. The Bodley Head.
Baland, J.M. and J.P. Platteau. (1996). Halting Degradation of Natural Resources: Is there a Role for Rural Communities? Oxford: Clarendon Press.
Bashirov, G. (2021). New extractivism and failed development in Azerbaijan. Third World Quarterly, DOI: 10.1080/01436597.2021.1926968
Baumol, W.J. and W.E. Oates. (1975). The theory of environmental policy. Externalities, public outlays, and the quality of life. Englewood Cliffs: Prentice Hall Inc.
Bebbington, A.J., L.A. Sauls, H. Rosa, B. Fash and D. Humphreys Bebbington. (2018). Conflicts over Extractivist Policy and the Forest Frontier in Central America. European Review of Latin American and Caribbean, 106:103-132. DOI: http://doi.org/10.32992/erlacs.10400
Bénabou, R. and J. Tirole. (2016). Individual and Corporate Social Responsibility. Economica, 77: 1–19
Benzig, A. (1998). How to Treat one's Mother—Considerations about the Relationship between Man and Environment in the Andes [Vom Umgang mit der Mutter—Überlegungen zum Verhältnis von Mensch und Natur in den Anden]. Journal of Agriculture in the Tropics and Subtropics, 111–124.
Berkes F, Colding J, Folke C. (2003). Navigating Social-Ecological Systems: Building Resilience for Complexity and Change. Cambridge University Press.
Berkes F, Folke C. (1998). Linking Social and Ecological Systems. Management Practices and Social Mechanisms for Building Resilience. Cambridge University Press.
Bernstein, S. and B. Cashore. (2004). In Kirton, J. and M. Trebilcock (eds.): Hard Choices, Soft Law: Voluntary standards in Global Trade, environmental and Social Governance. Aldershot, UK: Ashgate Press, pp. 33-64
Bishop, J., S. Kapila, F. Hicks, P. Mitchell and F. Vorhies. (2008). Building biodiversity business. London and Gland: Shell International Limited and the International Union for Conservation of Nature. Accessed 4. September 2020. https://portals.iucn.org/library/efiles/documents/2008-002.pdf.

Bowles, S. (1998). Endogenous Preferences: The Cultural Consequences of Markets and Other Economic Institutions. Journal of Economic Litera¬ture, XXXVI (March):75-111
Brand, U., Dietz, K. and Lang, M. (2016). Neo-Extractivism in Latin America. One Side of a New Phase of Global Capitalist Dynamics. Ciencia Política, 11(21):125-159.
Broad, R. and J. Fischer-Mackey. (2017). From extractivism towards buen vivir: mining policy as an indicator of a new development paradigm prioritising the environment, Third World Quarterly, 38:6, 1327-1349, DOI: 10.1080/01436597.2016.1262741
Bromley, D.W. (1991). Environment and Economy: Property Rights and Public Policy. Oxford: Basil Blackwell.
Bronckers, M. (2015). Is Investor–State Dispute Settlement (ISDS) Superior to Litigation Before Domestic Courts? An EU View on Bilateral Trade Agreements. Journal of International Economic Law, 18(3):655-677. https://doi.org/10.1093/jiel/jgv035
Brown, J., and Kothari, A. (2011). Traditional agricultural landscapes and community conserved areas: 3157 An overview. Management of Environmental Quality: An International Journal, 22(2), 139–3158 153. https://doi.org/10.1108/14777831111113347
Buchanan, J. (1978). From Private Preferences to Public Philosophy. In J. Buchanan (ed.),Environment and Economy: Property Rights and Public PolicyEnvironment and Economy: Property Rights and Public Policy. London, Institute of Economic Affairs.
Burton, R.J.F. (2004). Reconceptualising the 'behavioural approach' in agricultural studies: a socio-psychological perspective. Journal of Rural Studies, 20:359-371.
Busch, J. and Ferretti-Gallon. (2017). What Drives Deforestation and What Stops It? A Meta-Analysis. Review of Environmental Economics and Policy, 11(1):3–23. doi:10.1093/reep/rew013
Carrol, A.B. and K.M. Shabana. (2010). The Business Case for Corporate Social Responsibility: A Review of Concepts, Research and Practice. International Journal of Management Reviews (2010) DOI: 10.1111/j.1468-2370.2009.00275.x
Chan KM, Gould RK, Pascual U. (2018). Editorial overview: Relational values: what are they, and what's the fuss about? Current Opinion in Environmental Sustainability 35: A1–A7.
Chan KMA, Balvanera P, Benessaiah K, Chapman M, Díaz S, Gómez-Baggethun E, Gould R, Hannahs N, Jax K, Klain S, Luck GW, Martín-López B, Muraca B, Norton B, Ott K, Pascual U, Satterfield T, Tadaki M, Taggart J, Turner N. (2016). Why protect nature? Rethinking values and the environment. Proceedings of the National Academy of Sciences of the United States of America 113: 1462–1465.
Chasek, P.S. and D.L. Downie. (2020). Global Environmental Politics. Routledge
Child, J. and T. Tsai. (2005). The dynamic between firms' environmental strategies and institutional constraints in emerging economies: evidence from China and Taiwan. Journal of Management Studies, 42(1):95–125.
Coase, R.H. (1960). The problem of social cost. The Journal of Law and Economics, 3: 1–44.
Comberti C, Thornton TF, Wylliede Echeverria V, Patterson T. (2015). Ecosystem services or services to ecosystems? Valuing cultivation and reciprocal relationships between humans and ecosystems. Global Environmental Change 34: 247–262.
Common, M. and S. Stagl. (2005). Ecological Economics. An Introduction. Cambridge University Press
Connolly JJ, Svendsen ES, Fisher DR, Campbell LK. (2013). Organizing urban ecosystem services through environmental stewardship governance in New York City. Landscape and Urban Planning 109: 76–84.
Córdoba, D., M. Chiappe, J. Abrams and T. Selfa. (2017). Fuelling Social Inclusion? Neo-extractivism, State–Society Relations and Biofuel Policies in Latin America's Southern Cone. Development and Change 49(1):63–88. DOI: 10.1111/dech.12362
Cori. A. and S. Monni. (2015). Neo-extractivism and the Resource Curse Hypothesis: Evidence from Ecuador Development (2015) 58(4), 594–607. doi:10.1057/s41301-016-0053-x;
Coyle, D. (2014). GDP: A Brief but Affectionate History. Princeton: Princeton University Press.

Cropper, M. and C. Griffits. (1994). The Interaction of Population Growth and Environmental Quality. Source: The American Economic Review, 84(2,):250-254 URL: https://www.jstor.org/stable/2117838

Curtis, P.G., C.M. Slay, N.L. Harris, A. Tyukavina3, M.C. Hansen. (2018). Classifying drivers of global forest loss. Science 361, 1108–1111

Dacks R, Ticktin T, Mawyer A, Caillon S, Claudet J, Fabre P, Jupiter SD, McCarter J, Mejia M, Pascua P, Sterling E, Wongbusarakum S. (2019). Developing biocultural indicators for resource management. Conservation Science and Practice. https://doi.org/10.1111/csp2.38

Dahl, R.A. (1989). Democracy and Its Critics. Yale University Press,

Daly, H. (1977). Steady-State Economics. San Francisco, CA: W.H. Freeman and Company

Dasgupta, P. (2021). The Economics of Biodiversity: The Dasgupta Review. Abridged Version London: HM Treasury

Daugbjerg. C. (1998). Linking policy networks and environmental policies: Nitrate policy making in Denmark and Sweden 1970-1995. Public Administration, 76(Summer):275–294.

Dawson, N. M., B. Coolsaet, E. J. Sterling, R. Loveridge, N. D. Gross-Camp, S. Wongbusarakum, K. K. Sangha, L. M. Scherl, H. Phuong Phan, N. Zafra-Calvo, W. G. Lavey, P. Byakagaba, C. J. Idrobo, A. Chenet, N. J. Bennett, S. Mansourian, and F. J. Rosado-May. (2021). The role of Indigenous peoples and local communities in effective and equitable conservation. Ecology and Society 26(3):19. https://doi.org/10.5751/ES-12625-260319

de Freitas Netto, S.V., M.F. Falcão Sobral, A.R Bezerra Ribeiro and G.R. da Luz Soares. (2020). Concepts and forms of greenwashing: a systematic review. Environmental Science Europe, 32:19. https://doi.org/10.1186/s12302-020-0300-3

Dearlove, J. (1989). Neoclassical Politics: Public Choice and Political Understanding. Review of Political Economy, 1:208-237.

Delacote, P. (2009). On the sources of consumer boycotts ineffectiveness. The Journal of Environment & Development, 18(3): 306–22.

Delmas. M.A and V.C. Burbano .(2011). The Drivers of Greenwashing. California Management Review, 54(1):64–87. DOI: 10.1525/cmr.2011.54.1.64

Diener, E., and R. Biswas-Diener. (2002). Will Money Increase Subjective Well-Being?: A Literature Review and Guide to Needed Research, Social Indicators Research, 57(2): 119–69, http://www.jstor.org/stable/27526987.

Dominguez, P., Bourbouze, A., Demay, S., Genin, D., & Kosoy, N. (2012). Diverse Ecological, Economic and Socio-Cultural Values of a Traditional Common Natural Resource Management System in the Moroccan High Atlas: The Aït Ikiss Tagdalts. *Environmental Values*, *21*(3), 277–296. https://doi.org/10.3197/096327112X13400390125939

Doria, C.R.C, S. Athayde, H. Melo de Lima, F.M. Carvajal-Vallejos and J. Dutka-Gianelli. (2020). Challenges for the Governance of Small-Scale Fisheries on the Brazil-Bolivia Transboundary Region, Society & Natural Resources, 33:10, 1213-1231, https://www.tandfonline.com/doi/full/10.1080/08941920.2020.1771492

Dorninger, C., Hornborg, A., Abson, D. J., von Wehrden, H., Schaffartzik, A., Giljum, S., … Wieland, H. (2021). Global patterns of ecologically unequal exchange: Implications for sustainability in the 21st century. Ecological Economics, 179, 106824. doi:10.1016/j.ecolecon.2020.10

Easton, D. (1965). A Systems Analysis of Political Life, New York: Wiley.

Eghenter, C. (2018). Indigenous effective area-based conservation measures: Conservation practices among the Dayak Kenyah of North Kalimantan. Parks, 24(SI), 69–78. https://doi.org/10.2305/IUCN.CH.2018.PARKS-24-SICE.en

Ellerman. A.D., F.J. Convery and C. de Perthuis (eds.). (2010). Pricing Carbon. The European Union Emission Trading Scheme. Cambridge University Press.

Enqvist, J.P., S. West, V.A. Masterson, J. Haider, U. Svedin and M Tengö. (2018). Stewardship as a boundary object for sustainability research: Linking care, knowledge and agency. Landscape and Urban Planning, 179:17-37.

Farfán-Heredia, B., Casas, A., Moreno-Calles, A. I., García-Frapolli, E., & Castilleja, A. (2018). Ethnoecology of the interchange of wild and weedy plants and mushrooms in Phurépecha markets of Mexico: Economic motives of biotic resources management. Journal of Ethnobiology and Ethnomedicine, 14(1), 5. https://doi.org/10.1186/s13002-018-0205-z
Field, B.C. (2016). Natural Resource Economics. Waveland Press Inc., 3rd edn.
Fleming, P., J. Roberts and C. Garsten. (2013). In search of corporate social responsibility: Introduction to special issue. Organization, 20(3) 337–348
Folke C, Österblom H, Jouffray J-B, Lambin EF, Adger WN, Scheffer M, Crona BI, Nyström M, Levin SA, Carpenter SR, Anderies JM, Chapin S, Crépin A-S, Dauriach A, Galaz V, Gordon LJ, Kautsky N, Walker BH, Watson JR, Wilen J, de Zeeuw A. (2019). Transnational corporations and the challenge of biosphere stewardship. Nature Ecology & Evolution 3: 1396–1403.
Francescato, D., M.E. Mebane and M. Vecchione. (2017). Gender differences in personal values of national and local Italian politicians, activists and voters. Int J Psychol, 52: 406-414. https://doi.org/10.1002/ijop.12236
Friedman, M. (1970). The social responsibility of business is to increase its profits. New York Times Magazine, 13 September, 122–6.
Frynas, J.G and C. Yamahaki. (2016). Corporate social responsibility: review and roadmap of theoretical perspectives. Business Ethics: A European Review, 25(3):258-285
Fuchs D., Klingemann H.D. (2019). Globalization, Populism and Legitimacy in Contemporary Democracy. In: van Beek U. (eds) Democracy under Threat. Challenges to Democracy in the 21st Century. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-319-89453-9_1
Fukumoto, E. and B. Bozeman. (2019). Public Values Theory: What Is Missing? American Review of Public Administration 49(6):635-648. DOI: 10.1177/0275074018814244
Garrett, D.E. (1987). The effectiveness of marketing policy boycotts: environmental opposition to marketing. Journal of Marketing, 51(2): 46–57.
Gasson, R. (1973). Goals and values of farmers. Journal of Agricultural Economics, 24(3):521-538.
Gatti, L., P. Seele and L. Rademacher. (2019). Grey zone in – greenwash out. A review of greenwashing research and implications for the voluntary-mandatory transition of CSR. International Journal of Corporate Social Responsibility, 4:6. https://doi.org/10.1186/s40991-019-0044-9
Gavin MC, McCarter J, Berkes F, Mead ATP, Sterling EJ, Tang R, Turner NJ. (2018). Effective biodiversity conservation requires dynamic, pluralistic, partnership-based approaches. Sustainability (Switzerland) 10: 1–11.
Gavin MC, McCarter J, Mead A, Berkes F, Stepp JR, Peterson D, Tang R. (2015). Defining biocultural approaches to conservation. Trends in Ecology and Evolution 30: 140–145.
Geist, H.J. and E.F. Lambin. (2002). Proximate Causes and Underlying Driving Forces of Tropical Deforestation. BioScience, 52(2):143-150
Georgescu-Roegen, N. (1971). The Entropy Law and the Economic Process. Cambridge/ Massa¬chusetts: Harvard University Press.
Gomez-Baggethun, E. (2020). More is more: Scaling political ecology within limits to growth. Political Geography, 76: 102095. https://doi.org/10.1016/j.polgeo.2019.102095
Gómez-Baggethun, E. and J.M. Naredo. (2015). In search of lost time: the rise and fall of limits to growth in international sustainability policy. Sustainability Science, 10:385-395.
Guriev, S. and D. Treisman. (2020). The Popularity of Authoritarian Leaders. A Cross-National Investigation. World Politics, 72(4):601-638. https://doi.org/10.1017/S0043887120000167
Habermas, J. (1984). The Theory of Communicative Action. Vol. One: Reason and the Rationalization of Society. Boston, MA: Beacon Press.
Hansjürgens, B. (2005). Emissions Trading for Climate Policy: US and European Perspectives (p. 3811 245). https://doi.org/10.1017/CBO9780511493485

Haufler, V. (2009). Transnational actors and global environmental governance. In M.A. Delmas and O.R. Young (eds): Governance for the Environment. New Perspectives. Cambridge, UK: Cambridge University Press, pp. 119–43.
Heiskanen, E. (2005). The performative nature of consumer research: consumers' environ-mental awareness as an example. Journal of Consumer Policy, 28(2): 179–201.
Herrera-Cabrera, B. E., Campos Contreras, J. E., Macías-Cuéllar, H., Delgado-Alvarado, A., & Salazar-3869 Rojas, V. M. (2018). Beyond the traditional home garden: A circa situm conservation experience of Laelia anceps subsp. dawsonii f. chilapensis Soto-Arenas (Orchidaceae). Environment, Development and Sustainability, 22(3), 1913–1927. https://doi.org/10.1007/s10668-018-0270-4
Hester, R.E. and R.M. Harrison. (2012). Environmental Impacts of Modern Agriculture. Issues in Environmental Science and Technology, vol 34. RSC Publishing
Hickel, J. and G Kallis. 2020: Is Green Growth Possible?, New Political Economy, DOI: 10.1080/13563467.2019.1598964
Hooley, G.J., G.E. Greenley, J.W. Cadogan and J. Fahy. (2005). The performance impact of marketing resources. Journal of Business Research, 58(1): 18–27.
Hoover, J., M. Sabaratnam and L. Schouenborg. (2011). Interrogating Democracy in World Politics Routledge
Horne, R.E. (2009). Limits to labels: The role of eco-labels in the assessment of product sustainability and routes to sustainable consumption. International Journal of Con-sumer Studies, 33:175–182
Hull, V. and J. Liu. (2018). Telecoupling: A new frontier for global sustainability. Ecology and Society 23(4):41. https://doi.org/10.5751/ES-10494-230441
IPBES. (2019). Global Assessment Report on Biodiversity and Ecosystem Services. https://-ipbes.net/global-assessment
Jackson, T. (2017). Prosperity without growth. Economics for a finite planet. Routledge.
Jacobs, S., Zafra-Calvo, N., Gonzalez-Jimenez, D., Guibrunet, L., Benessaiah, K., Berghöfer, A., . . . Balvanera, P. (2020). Use your power for good: Plural valuation of nature – the Oaxaca statement. Global Sustainability, 3, E8. doi:10.1017/sus.2020.2
Johanisova, A. and E. Franková. (2017). Eco-Social Enterprises. In Spash, C.L. (ed.): Rout-ledge Handbook of Ecological Economics. Oxon: Routledge, pp. 507-516.
Jones, R., Rigg, C., and Lee, L. (2010). Haida Marine Planning: First Nations as a Partner in Marine 4070 Conservation. Ecology and Society, 15(1), art12. https://doi.org/10.5751/ES-03225-150112
Kallis, G. (2011). In defence of degrowth. Ecological Economics, 70(5):873-880. https://doi.org/10.1016/j.ecolecon.2010.12.007
Kapp, K.W. (1971). The Social Costs of Private Enterprise. New York: Schoken Books.
Kashwan, P., L.M. MacLean and G.A. García-López. (2019). Rethinking power and institutions in the shadows of neoliberalism. World Development, 120: 133-146. doi:10.1016/j.worlddev.2018.05.026
Kasser, T., R.M. Ryan, C.E. Couchman and K.M. Sheldon. (2004). Materialistic values: their causes and consequences. In T. Kasser and A.D. Kanner (eds): Psychology and Consumer Culture: The Struggle for a Good Life in a Materialistic World. Washington, DC: American Psychology Association, pp. 11–28.
Klooster, D. (2006). Environmental certification of forests: the evolution of environmental governance in a commodity network. Journal of Rural Studies, 21(4): 403–17.
Kolstad, C. (2000). Environmental Economics. Oxford: Oxford University Press.
Kraakman, R., J. Armour, P. Davies, L. Enriques, H. Hansmann, G. Hertig, K. Hopt, H. Kanda, M. Pargendler, W.-G. Ringe, and E. Rock. (2009). The Anatomy of Corporate Law. Oxford University Press
Krausmann, F. (2017). Social metabolism. In Spash, C.L. (ed.): Rout¬ledge Handbook of Ecological Economics. Oxon: Routledge, pp. 108-118.

Krugman, P. and R. Wells. (2015). Microeconomics. Worth Publishers, 4th edn.
Kuznets, S. (1934). National Income, 1929–1932. Senate Document No. 124, 73rd Congress,
Kvakkestad, V., P.K. Rørstad and A. Vatn. (2015). Norwegian farmers' perspectives on agriculture and agricultural payments: Between productivism and cultural landscapes. Land Use Policy 42:83-92.
Laidi, Z. and P.J. Costopoulos. (2002). Democracy in Real Time. Journal of Democracy, Volume 13(3):68-79. DOI: 10.1353/jod.2002.0047
Layard, P.R.G. (2005). Happiness: Lessons from a New Science. New York: Penguin Press.
Liu J, Dietz T, Carpenter SR, Alberti M, Folke C, Moran E, Pell AN, Deadman P, Kratz T, Lubchenco J, Ostrom E, Ouyang Z, Provencher W, Redman CL, Schneider SH, Taylor WW. (2007). Complexity of coupled human and natural systems. Science 317: 1513–1516.
Mancilla García M., Hertz T, Schlüter M, Preiser R, Woermann M. (2020). Adopting process-relational perspectives to tackle the challenges of social-ecological systems research. Ecology and Society 25.
Mankiw, N.G. and M.P. Taylor. (2014). Microeconomics. Hampshire, Cengage Learning.
Manzo, L., and Devine-Wright, P. (2021). Place Attachment: Advances in Theory, Methods and Applications (second Edition). Routledge.
March, J. G., and P.J. Olsen. (1995). Democratic governance. Free Press.
Marshall NA, Park SE, Adger WN, Brown K, Howden SM. (2012). Transformational capacity and the influence of place and identity. Environmental Research Letters 7: 9.
Martinez-Alier, J.M. (2003). The Environmentalism of the Poor. A Study of Ecological Conflicts and Valuation. Edward Elgar, Cheltenham (UK).
Martinez-Alier, J.M. (2009). Socially sustainable economic degrowth. Development and Change 40 (6), 1099–1119. https://doi.org/10.1111/j.1467-7660.2009.01618.x
Masterson VA, Stedman RC, Enqvist J, Tengö M, Giusti M, Wahl D, Svedin U. (2017). The contribution of sense of place to social-ecological systems research: A review and research agenda. Ecology and Society 22.
Mateo-Sagasta, J., S.M. Zadeh and H. Turral. (2017).Water pollution from agriculture.: a global review. Executive summary. FAO and IWMI.
McFaul, M. (2004). Democracy promotion as a world value, The Washington Quarterly, 28(1):147-163, DOI: 10.1162/0163660042518189
McMillen HL, Campbell LK, Svendsen ES, Kealiikanakaoleohaililani K, Francisco KS, Giardina CP. (2019). Biocultural Stewardship , Indigenous and Local Ecological Knowledge , and the Urban Crucible. 11386: 1–34.
Meynhardt, T. (2009). Public value inside: What is public value creation? International Journal of Public Administration, 32, 192-219.
Miliband, R. (1969). The State in Capitalist Society. London: Weidenfeld and Nicolson.
Molina Bedoya, V.A. (2015). Existencia equilibrada. Metáfora del Buen Vivir de los pueblos indígenas Balanced Living. Metaphor of the Good Living among indigenous peoples Vida equilibrada. Metáfora do Bom Viver dos povos indígenas. Polis [En línea], 40 Publicado el 16 mayo 2015, consultado el 20 abril 2019. URL : http://journals.openedition.org/polis/10679
Movik, S. and K.B. Stokke. (2015). Contested knowledges, contested responsibilities: The EU Water Framework Directive and salmon farming in Norway. Norwegian Journal of Geography, 69:4:242-255, DOI: 10.1080/00291951.2015.1061049
Muñoz, P. and B. Cohen. (2017). Sustainable Entrepreneurship Research: Taking Stock and looking ahead. Business Strategy and the Environment. DOI: 10.1002/bse.2000
Murphy A, Enqvist JP, Tengö M. 2019. Place-making to transform urban social–ecological systems: insights from the stewardship of urban lakes in Bangalore, India. Sustainability Science 14: 607–623.
Neiman, J. L., Gonzalez, F. J., Wilkinson, K., Smith, K. B., & Hibbing, J. R. (2015). Speaking Different Languages or Reading from the Same Script? Word Usage of Democratic and

Republican Politicians. Political Communication, 33(2), 212–240. doi:10.1080/10584609.2014.969465
Nilson M. (2005). Learning, frames, and environmental policy integration: the case of Swedish energy policy. Environment and Planning C: Government and Policy, 23:207-226. DOI:10.1068/c0405j
Niskanen, W. (1971). Bureaucracy and Represenative Government. Chicago: Aldine-Atherton
North, D.C. (1981). Structure and Change in Economic History. Norton.
Norton, A. and D. Elson. (2002). What's behind the budget? Politics, Rights and Accountability in the Budget Process. Working Paper. Social Development Department at the Department for International Development. London
O'Neill J, Holland A, Light A. (2008). Environmental Values. Routledge.
Obando, D. (2009). Economía solidaria: ¿en función de un desarrollo alternativo o de un neocapitalismo? ALTERIDAD. Revista de Educación, (1): 88-97. https://www.redalyc.org/pdf/4677/467746245008.pdf
Ostrom E. (2009). A general framework for analyzing sustainability of social-ecological systems. Science 325: 419–422.
Ostrom, E. (1990). Governing the Commons: The Evolution for collective action. Cambridge: Cambridge University Press.
Ostrom, E. (2005). Understanding Institutional Diversity. Princeton, NJ: Princeton University Press.
Otero, I. et al (2020). Biodiversity policy beyond economic growth. Conservation Letters. 2020;e12713. https://doi.org/10.1111/conl.12713
Pascual, U., E. Corbera, R. Muradian, and N. Kosoy. (2010). Special Issue: Payments for environmental Services: reconciling theory and practice. Ecological Economics, 69(6): 1202-1302
Pattberg, P. (2005). What Role for Private Rule-Making in Global Environmental Governance? Analysing the Forest Stewardship Council (FSC). International Environmental Agreements, 5:175-189.
Paulson, S. (2017). Degrowth: culture, power and change, Journal of Political Ecology 24(1): 425-448. doi: https://doi.org/10.2458/v24i1.20882
Pelc, K.J. (2017). What Explains the Low Success Rate of Investor-State Disputes? Interna-tional Organization, 71(3):559-583. https://doi.org/10.1017/S0020818317000212
Piketty, T. (2020). Capital and Ideology. Cambridge MA: The Belknap Press of Harvard University Press.
Pizzetti, M., L. Gatt and P. Seele. (2021). Firms Talk, Suppliers Walk: Analyzing the Locus of Greenwashing in the Blame Game and Introducing 'Vicarious Greenwashing'. Journal of Business Ethics, 170:21–38. https://doi.org/10.1007/s10551-019-04406-2
Poulantzas, N. (1978). State, Power, Socialism. Thetford, UK: Lowe & Brydone Printers Ltd.
Pröpper M, Haupts F. (2014). The culturality of ecosystem services. Emphasizing process and transformation. Ecological Economics 108: 28–35.
Purdey, S.J. (2009). Economic Growth, the Environment and International Relations: The Growth Paradigm. Routledge, London and New York.
Ranjan R. and V.P. Upadhya. (1999). Ecological problems due to shifting cultivation. Current Science, 77(10):1246-1250
Raymond, C.M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M. R., Geneletti, D., and Calfapietra, C. (2017). A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. Environmental Science and Policy, 77. https://doi.org/10.1016/j.envsci.2017.07.008
Razeto, L. (2010). ¿Qué es la economía solidaria? Papeles de relaciones ecosociales y cambio global,110: 47-52.
Robertson, T. (2008). Development. In: van Dijk, R. (Ed.): Encyclopedia of the Cold War Volume 1. Taylor & Francis, London, pp. 254–256.

Rockström, J., W. Steffen, K. Noone, Å. Persson, F.S. Chapin III and E. Lambin et al. (2009). Planetary boundaries: exploring the safe operating space for humanity. Ecology and Society, 14(2): Art. 32.
Rogelj, J. M. den Elzen, N. Höhne, T. Fransen, H. Fekete, H. Winkler, R. Schaeffer, F. Sha, K. Riahi og M. Meinshausen. (2016). Paris Agreement Climate Proposals Need a Boost to Keep Warming Well below 2 °C. Nature, 534(7609):631-639.
Røpke, I. (2009). Theories of practice—New inspiration for ecological economic studies on consumption. Ecological economics, 68(10):2490-2497. https://doi.org/10.1016/-j.ecol¬econ.2009.05.015
Ruvio, A.A. and R.W. Belk. (2013). Conflicting selves and the role of possessions: a process view of transgenders' self-identity conflict. In A.A. Ruvio and R.W. Belk (eds): The Routledge Companion to Identity and Consumption. Abingdon, UK: Routledge, pp. 141–147.
Schachenmann, P. (2006). Spiritual Values in Madagascar: The Starting Point for Endogenous Conservation Initiatives. Mountain Research and Development, 26(4):323-327. https://doi.org/10.1659/0276-4741(2006)26[323:SVIM]2.0.CO;2
Schatzki, T.R., Knorr-Cetina, K., and von Savigny, E. (Eds.) (2001). The Practice Turn in Contem¬po¬rary Theory. London: Routledge.
Schill C, Anderies JM, Lindahl T, Folke C, Polasky S, Cárdenas JC, Crépin A-S, Janssen MA, Norberg J, Schlüter M. (2019). A more dynamic understanding of human behaviour for the Anthropocene. Nature Sustainability 1–8.
Schlüter M, Haider LJ, Lade SJ, Lindkvist E, Martin R, Orach K, Wijermans N, Folke C. (2019). Capturing emergent phenomena in social-ecological systems: An analytical framework. Ecology and Society 24.
Schmelzer, M. (2015). The growth paradigm: History, hegemony, and the contested making of economic growthmanship. Ecological Economics, 118:262–271. http://dx.doi.org/10.1016/j.ecolecon.2015.07.029
Singh, R.K. (2013). Ecoculture and subsistence living of Monpa community in the eastern Himalayas: 5044 An ethnoecological study in Arunachal Pradesh. 12(3), 13.
Sjåfjell, B. (2011). Why law matters: corporate social irresponsibility and the futility of voluntary climate change mitigation. European Company Law, 8(2–3): 56–64.
Sjølander-Lindqvist, A., C. Risvoll, R. Kaarhus, Aa.K. Lundberg and C. Sandsreöm. (2020). Knowledge Claims and Struggles in Decentralized Large Carnivore Governance: Insights from Norway and Sweden. Front. Ecol. Evol. 8:120. 10.3389/fevo.2020.00120
Skjærseth, J.B. and T. Skodvin. (2001). Climate change and the oil industry: common problems, different strategies. Global Environmental Politics, 1(4): 43–64.
Smart, S. (2020). The political economy of Latin American conflicts over mining extractivism. The Extractive Industries and Society 7:767–779. https://doi.org/10.1016/j.exis.2020.02.004
Sneirson, J.F. (2011). The sustainable corporation and shareholder profits. Wake Forest Law Review, 46: 541–59.
Song, E.Y. (2008). Competing Values in World Culture and the Emergence of Middle Ground. Comparative Sociology, 7(1):28–50. https://doi.org/10.1163/156913308X260457
Spash, C.L.and K. Dobernig. (2017). Theories of (un)sustainable consumption. In Spash, C.L. (ed.): Routledge Handbook of Ecological Economics. Routledge, pp. 203-213.
Speich, D. (2008). Travelling with the GDP through early development economics' history. Working papers on the nature of evidence: how well do 'facts' travel? (33/08). Department of Economic History, London School of Economics and Political Science, London, UK. http://eprints.lse.ac.uk/22501/1/3308Speich.pdf
Stahl, G.K. and M.S de Luque. (2015). Antecedents of Responsible Leader Behavior: Conceptual Framework, and Agenda for Future Research. Academy of Management Perspectives, 28(3):235-254
Steil, B. (2013). The Battle of Bretton Woods: John Maynard Keynes, Harry Dexter White, and the Making of a New World Order. Princeton, NJ: Princeton University Press.

Sterling EJ, Filardi C, Toomey A, Sigouin A, Betley E, Gazit N, Newell J, Albert S, Alvira D, Bergamini N, Blair M, Boseto D, Burrows K, Bynum N, Caillon S, Caselle JE, Claudet J, Cullman G, Dacks R, Eyzaguirre PB, Gray S, Herrera J, Kenilorea P, Kinney K, Kurashima N, MacEy S, Malone C, Mauli S, McCarter J, McMillen H, Pascua P, Pikacha P, Porzecanski AL, De Robert P, Salpeteur M, Sirikolo M, Stege MH, Stege K, Ticktin T, Vave R, Wali A, West P, Winter KB, Jupiter SD. (2017). Biocultural approaches to well-being and sustainability indicators across scales. Nature Ecology and Evolution 1: 1798–1806.

Stewart, J. (2009). Public Policy Values. New York: Palgrave Macmillan.

Stutzer, R., Rinscheid, A., Oliveira, T.D. et al. (2021). Black coal, thin ice: the discursive legitimisation of Australian coal in the age of climate change. Humanities and Social Sciences Communication, 8, 178. https://doi.org/10.1057/s41599-021-00827-5

Temper, L., Demaria, F., Scheidel, A. et al. (2018). The Global Environmental Justice Atlas (EJAtlas): ecological distribution conflicts as forces for sustainability. Sustain Sci 13, 573–584. https://doi.org/10.1007/s11625-018-0563-4

TerraChoice. (2010). The sins of greenwashing: home and family edition. Retrieved from: http://faculty.wwu.edu/dunnc3/rprnts.TheSinsofGreenwashing2010.pdf

Thomas, C.W. (1997). Public Management as Interagency Cooperation: Testing Epistemic Community Theory at the Domestic Level. Journal of Public Administration Research and Theory, 7(2):221-246.

Thomas, J.M. and S. Callan. (2010). Environmental Economics: Applications, Policy, and Theory

Tietenberg, T. and L. Lewis. (2020). Environmental Economics. The Essentials. Routledge.

Tofte Thorsen, M. (2020). Only In It for Power and Wealth? Investigating Dictators' Motives. PhD Dissertation. Department of Political Science. Aarhus University. Denmark. https://politica.dk/fileadmin/politica/Dokumenter/Afhandlinger/matilde_thorsen.pdf

Tooze, A. (1998). Imagining national economies: National and International Economics Statistics 1900–1950. In: Cubitt, G. (Ed.), Imagining Nations. Manchester University Press, Manchester, pp. 212–228.

Turner, M.D. (2011). The new pastoral development paradigm: engaging the realities of property institutions and livestock mobility in dryland Africa. Society and Natural Resources, 24(5): 469–84.

UN. (2012). Resolution adopted by the General Assembly on 27 July 2012. The future we want Outcome of the United Nations Conference on Sustainable Development A/CONF.216/L.1 https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E

UNDP. (2015). Humanity Divided: Confronting Inequality in Developing Countries. https://www.undp.org/publications/humanity-divided-confronting-inequality-developing-countries

UNEP. (2011). Towards a GREEN Economy. Pathways to Sustainable Development and Poverty Eradication A Synthesis for Policy Makers. https://sustainabledevelop-ment.un.org/content/documents/126GER_synthesis_en.pdf

UNEP/UNCTAD. (1974). The Cocoyoc Declaration adopted by the participants in the UNEP/UNCTAD Symposium on "Patterns of Resource Use, Environment and Development Strategies" held at Cocoyoc, Mexico, from 8 to 12 October. https://digitallibrary.un.org/record/838843

Union of Concerned Scientists. (2007). Smoke, Mirrors, and Hot Air. http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/exxon_report.pdf.

United Nations. (1972). Report of the United Nations Conference on the Human Environment. Stockholm. https://www.un.org/ga/search/view_doc.asp?symbol=A/CONF.48/14/REV.1.

Vatn, A. (2015). Environmental Governance. Institutions, Policies and Actions. Cheltenham: Edward Elgar.

Vatn, A. (2021). Bærekraftig økonomi. Innsikt fra økologiske og institusjonell økonomi. Bergen; Fagbokforlaget.
Veltmeyer, H. (2013). The political economy of natural resource extraction: a new model or extractive imperialism? Canadian Journal of Development Studies, 34(1):79-95, DOI: 10.1080/02255189.2013.764850
Vogt, M (ed.). (2019). Sustainability Certification Schemes in the Agricultural and Natural Resource Sectors: Outcomes for Society and the Environment. Routledge.
Walker, K. and F. Wan. (2012). The Harm of Symbolic Actions and Green-Washing: Corporate Actions and Communications on Environmental Performance and Their Financial Implications. Journal of Business Ethics, 109(2):227-242. https://www.jstor.org/stable/23259314
Ward, T. and B. Phillips (eds.). (2008). Seafood Ecolabelling. Principles And Practice. Wiley-Blackwell.
WCED (World Commission on Environment and Development). (1987). Report from the UN World Commission on Environment and Development: Our Common Future [Brundtland Report]. http://www.un-documents.net/wced-ocf.htm.
Welch, D. and A. Warde. (2015). Theories of practice and sustainable consumption. In and J. Thøgersen (eds.): Handbook on Research of Sustainable Consumption. Edward Elgar, pp. 84-100.
West S, Haider LJ, Stålhammar S, Woroniecki S. (2020). A relational turn for sustainability science? Relational thinking, leverage points and transformations. Ecosystems and People 16: 304–325
World Bank. (n.y). Total nature resource rents (% GDP). https://data.worldbank.org/indicator/NY.GDP.TOTL.RT.ZS.
Wunder, S., S. Engel and S. Pagiola. (2008). Taking stock: a comparative analysis of payments for environmental services programs in developed and developing countries. Ecological Economics, 65(4): 834–52.

Annex 2.16 Literature review on value formation and change

This literature review was meant to detect and describe diverse concepts from broader literature on value formation and change.

The literature reviewed was obtained using Stage I[35]. All articles categorized as "values formation" or "values change" were read to determine relevance (n=94). A 'snow-ball technique' was also used, whereby the bibliography of these publications was consulted and searched to add additional sources. Finally, Stage II techniques were used for specific topics, including "natural disasters and values".

Results

Individual-level processes

Human biology and *evolution* demonstrate that humans are not entirely separate from nature. This perspective (e.g., biophilia hypothesis, Fromm, 1964; Wilson, 1984) considers that values partially form within an individual, due to biological dependence on nature for survival, leading humans, as a species to, inherently value nature in both positive and negative terms (e.g., utilitarian, naturalistic, ecologistic-scientific, aesthetic, symbolic, humanistic, moralistic, dominionistic and negativistic values, Kellert, 1993; Ross et al., 2018). In particular, humanistic, affective, aesthetic, moral and symbolic values have been associated with nature connectedness (Lumber et al., 2017). Similarly, psychology focuses on "universal values" (akin to broad values) that appear to be common among all humans (e.g., the desire for equality or security, Schwartz, 1992, 1994). Generally, psychology conceives values as stable and influential in forming more malleable attributes like attitudes, judgements and behaviour (e.g., cognitive hierarchy theory, Whittaker et al., 2006).

Human biology also influences *cognition* and *development* processes, the focus of seminal psychologists (e.g., Rokeach, 1973). Here, attention is placed on human's cognitive processes like decision-making or problem-solving capabilities, which scaffolds value-based or moral reasoning (Rest, 1974), in the context of the *life cycle*. Developmental changes over an individual's lifetime carve a journey of moral development, originally theorised as a series of uniform stages across individuals and cultures (e.g., Kohlberg, 1971; Gilligan, 1993). However, subsequent revisions recognised the importance of the individual's 'social perspective taking' during the development process, which depends on social context (Gibbs et al., 2009). Therefore, value formation does not necessarily culminate in a universal set of values, rather the cognitive-development process is considered universal, but influenced by social factors.

This perspective considers that values "form" mostly in childhood and early adulthood as part of maturation, after which values become more fixed (Keil, 1922; Piaget, 1936). Similarly, mainstream economic schools-of-thought apply value indicators of market prices that are understood as reflecting an individual's preferences and are considered to be stable (Becker, 1976). Except for some examples from environmental valuation and business administration that look at preference construction (e.g., Payne et al., 1999), this tradition does not emphasize value formation and change *per se*, which is more emphasized in the psychologically-oriented literature on preference construction (Gregory et al., 1993; Lichtenstein & Slovic, 2006; Hausman, 2012).

From the individual perspective, value change is considered difficult and may require significant shifts that arise from how the individual interacts with other people through social processes (Bardi et al., 2009). For example, Ingrian adolescents and adults who transitioned from Russia to living in Finland showed value change, but this change was not sustained in the long-term; participants returned to baseline values after a two-year period (Lönnqvist et al., 2011). However, when values

[35] Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).

are challenged, conscious effort may cause one to thoughtfully and consciously restructure one's value priorities (Bardi & Goodwin, 2011; Raymond & Raymond, 2019; Rokeach, 1973). In the face of such catastrophic events as war, individuals have been shown to decrease the importance of broad values like benevolence, universalism, self-direction, stimulation and hedonism, while increasing the importance of security, tradition and power (Daniel et al., 2012). In other words, once one reaches maturity, life transitions that involve discrete alterations (e.g., a new position) are not likely to affect one's broad values, but when multiple aspects of one's life (e.g., daily activity, social support network, residence) are modified, then value change is more likely to occur (Bardi et al., 2014).

Overall, an individual might reshape her value structure, but evidence indicates that such a change is not undertaken lightly and requires broader social and social-ecological factors. Psychology has contributed to individual-level behaviour-change campaigns, but attention is turning toward understanding the role of individuals in collective and collaborative actions for environmental sustainability (Amel et al., 2017). As such, policymaking can consider approaching values change through efforts to affect the individual via institutional structures (e.g., via political process and policies) that affect value formation and change processes in the long-term.

Social processes

Individuals are never entirely separate from others, just as humans are never entirely separate from nature. Group-oriented value formation and change theories highlight how meaning and interpretation of nature, including values, are 'constructed' from worldviews and *social dynamics* (e.g., sociology: Hitlin & Piliavin, 2004; anthropology: Graeber, 2001). As such, nature's specific values can form due to social and cultural experiences and practices (i.e., "habitus"; Bourdieu, 1990) that are independent of the individual (Levi-Strauss, 1973; Cooper et al., 2016; Dumont, 1980, 1986). The common experience of cultures, which are historical legacies that have co-evolved over long periods of time, partially form values by social dynamics like consumption patterns (e.g., Grusec & Hastings, 2007; Haviland, 1999) or how people relate to nature (Chan et al., 2016; Ishihara, 2018). Social dynamics also lead to values constantly competing with each other (Weber, 1946), and different value systems are based on a hierarchy of dominant and subordinate values (Dumont, 1980). From this perspective, value change can occur due to social dynamics that affect the prioritization of values, and it follows that policy interventions seeking to affect the behaviour of a target group may want to consider focusing on dominant values that shape others (Schultz & Zelezny, 2003; Coquil et al., 2018; Deb & Malhotra, 2001; Singh, 2013; Zahn et al., 2018).

The *institutional context* of collective norms and rules (e.g., dialogue, education, religion) influences how values become institutionalised and *shared* in societies (Dewey, 1922). For example, social context coupled with individual desire and hedonic experience are factors that influence which values are activated in any individual or group (Higgins, 2006). Via social context (e.g., institutions), communication and interaction with others can form and change the importance given to specific values (Dewey, 1922; Habermas, 1991). For example, Robbins (2015) summarises how informal education provides a social context that embodies representations of values and helps internalise social values within the individual. Religion, too, can be conceived as a social context that embraces values in both beliefs and actions (Aldridge, 2007) and has been empirically linked to broad values like benevolence, tradition and conformity (Schwartz & Huismans, 1995; Saroglou et al., 2004). Religious meaning systems often determine value based on perceived sanctity or divinity (Silberman, 2005), which arises from supernatural or natural sources. However, as a social context, it enables value formation and change to be viewed religiously even outside formal organizations. As such, religion's social role in values formation and change can be viewed through an institutional lens, whether or not it is based on belief in a god or gods. Religion as a system of norms and rules not only expresses values, but also elicits, forms and constrains the values that individuals and groups develop and their associated behaviours.

For policies, targeted changes in the institutions that dominate people's lives can also influence the values that are activated, formed and expressed in a society. For example, democratic institutions can reflect changes in a society's value priorities, but also foster further change through acknowledging political rights and facilitating civil society engagements (Escher & Walter-Rogg, 2020; Te Aho, 2019). In this sense, institutions structure the distribution of goods and services within society, which in turn dictate interactions that influence human development and affect values (Bowles, 1998). For example, studies have documented how exposure to new markets can alter IPLC values in terms of political and economic goals, religious norms, family values and gender roles (Taussig 1980; Ensminger 1992). Based on such insights, Bowles (1998) identified five ways that markets and economic institutions affect values: (*1)* different economic institutions provide different framing and situational constructs that lead individuals to different prioritizations of specific values and preferences; (*2)* intrinsic and extrinsic motivations influence an individual's specific values and preferences in given contexts; (*3)* socio-economic institutions affect social interactions and thereby the evolution of norms; (*4)* economic institutions structure tasks, which impact people's capacities and values; and (*5)* economic institutions affect cultural learning processes, which can ultimately alter values.

Given that nature's values are '*deeply embedded in society's material culture, collective behaviours, traditions, and institutions*' (Manfredo et al., 2017, p. 772), value change policies can consider societal scales and account for *intra- and inter-generational processes* (e.g., language loss). On the aggregate, values can change due to demographic shifts (i.e., immigration or emigration affecting the constitution of social groups; Kendal & Raymond, 2019). In the past 50 years, studies have shown a shift away from materialistic values (e.g., values related to economic growth and consumption) towards post-materialistic values (e.g., increased emphasis on quality-of-life; Greenfield, 2009). Similarly, in the western US younger generations tend to hold more 'mutualism' values of living with wildlife (e.g., viewing all living things as part of one big family), compared to more 'domination' values (e.g., seeing fish and wildlife as primarily on earth for people to use) (Manfredo et al., 2020). These shifts have been associated with increased environmental consciousness (Cotgrove & Duff, 1981; Inglehart, 1995), though the extent to which this consciousness leads to environmental behavior and action is complex. In keeping with these notions, value change is most likely to occur not due to small stimuli or factors, but rather when there are major shifts in entire social-ecological systems.

Social-ecological level processes

Social-ecological processes highlight human-nature interactions (or social-ecological "encounters"). They do not divide humans from other-than-human beings (Muraca, 2011, 2016), but instead highlight the dynamic relationship between them. We identified six concepts that address combined "social" and "ecological" mechanisms of value formation and change that can inform policies were identified. These social-ecological value formation and change processes are entangled in the lives of people in diverse cultural contexts around the world – including, but certainly not limited to, those who labour to protect biodiversity.

Social-ecological systems (SES) frameworks provide an integrated understanding of nature's values. Ecosystem services and NCP are prominent examples of social-ecological systems frameworks that conceptualise value as arising from *human-nature interactions* that are foundational determinants of quality-of-life (e.g., Bieling et al., 2014). These are interdisciplinary concepts and combine biophysical and social measures of ecosystems to understand nature's values. They relate to value formation and change because they make explicit how humans depend on nature, which can also lead people to modify the way they value nature itself (Satz et al., 2013). Research on cultural ecosystem services and the related topic of relational values explores non-material NCP, which are values that arise from social-ecological interactions (e.g., Milcu et al., 2013). This approach attends to how emergent properties of social-ecological interactions can provide human well-being and uses socio-cultural valuation methods (Gómez-Baggethun et al., 2010), whereby individuals and groups may

become more aware of values that they have not previously conceptualised (Gould et al., 2014). Taking a slightly different angle, socio-cultural valuation of ecosystem services (Scholte et al., 2015) explicitly explains how individual and group-level values form when personal and social factors (e.g., personal characteristics, demographics, social context) interact with nature's ecological components (e.g., biodiversity, ecosystem condition, landscape configuration).

Similar to social-ecological systems, other scholarly traditions recognise that nature's values arise from the *relationships* people have with their surroundings, including with biodiversity (Faith, 2021), and with other people in the context of nature. These perspectives (e.g., affordance theory) conceive meaning (including values) not as something that humans merely invent or socially construct; instead, humans discover meaning (and values) in the environment by actively engaging with it physically or mentally (Chemero, 2009; Heft, 2001; Rietveld & Kiverstein, 2014). In these perspectives, human relationships and interactions with other species and ecosystems are central determinants of how people think and behave (Newen, 2018). As such, values form not based on what something *is*, but what it might *provide*, via relationship, in a given context. For example, when people perceive a berry bush, they do not merely perceive an object of nature; we, but also perceive the opportunity to pick (and later eat or share) berries (Chemero, 2009; Heft, 2001). The social-ecological relationship of picking, eating or sharing is part of value formation. Other research that focuses on relationships notes that emotional experiences in nature (e.g., "environmental epiphanies") can strongly influence human-nature relationships and consequently impact values (Vining & Merrick, 2012), which can be particularly important in childhood (Lekies and Berry 2013, Chawla, 2020).

This pathway highlights the *interdependence* of social and ecological factors, and thus denies the dichotomy of non-humans as "objects" and humans as "subjects". *Interconnectedness* resonates with many IPLC perspectives. Though some of the work just described attempts to represent these IPLC perspectives using academic conventions, other knowledge systems often emphasize encounter-based value formation. Non-academic traditions are often expressed in practices (e.g., politics, healing). For example, socio-political processes in Ecuador and Bolivia have recognised that these countries are plurinational and incorporated into their constitutions Amerindian concepts like *sumak kawsay*, which considers value formation as related to living in togetherness with nature as an interconnected system. The Japanese tradition *shinrin-yoku* (or "forest bathing") is another *interconnected* social-ecological process that actively uses the sensorial experience of nature to produce health benefits (e.g., lowering blood pressure; Hansen et al., 2017) and indirectly forms values about this human-nature relationship.

Various social and humanist perspectives, such as phenomenology, also recognise that nature's values emerge from an intertwined mix of collective social experiences *embedded* in living and responsive places (Durkheim, 1974; Graeber, 2001; Munn, 1986; Turner, 2003). Embeddedness means that peoples' relationships with place are intertwined with environmental values; environmental philosophy and human geography both demonstrate this connection (Brown & Brabyn, 2012; Brown & Raymond, 2007; Donohoe, 2016; Drenthen, 2015; Manzo & Devine-Wright, 2021; Masterson et al., 2017; Norton & Hannon, 1997; Rolston, 1994, 1982). Examples of values forming or changing as a result of embeddedness are associated with value-laden narratives, site-specific rituals, sacred landscapes, place-responsive practices and research dictated by particular places (Robbins, 2015; University of Hawai'i et al., 2018). Similarly, cultural and artistic practices can be associated with interconnectedness and embeddedness. These practices often take place in or are inspired by nature, and these practices and the physical outputs they produce can express and produce a world infused with meaning, including values (Carr, 2004; Bratton, 2008).

From a policy perspective, *education* is almost universally proposed as a solution to environmental problems, particularly for children and youth. *Environmental (or sustainability) education* involves much more than knowledge transfer and can be relevant to integrate academic and ILK understandings (e.g., encouraging a new moral framework for forestry; Zahn et al., 2018). A core

aspect of research-based environmental pedagogy encourages learners to engage with the social-ecological systems that surround them in myriad ways and implicitly promotes environmental values in general (Gress & Hall, 2017; Nolet, 2009). Comprehensive environmental education also develops learners' understanding of complex, interdependent systems; sense of agency and empowerment to facilitate positive change; and skills and motivations required to be an active, engaged citizen (Stevenson et al., 2012). A small amount of environmental education scholarship addressed values explicitly in the 1980s (Caduto, 1983), but in the ensuing decades the field has rarely addressed values explicitly. Yet values are intertwined with multiple central tenets of environmental education. Environmental education interventions can increase *connection to nature* (Barrable & Booth, 2020; Britto dos Santos & Gould, 2018; Chawla, 2020), a concept expressed with statements such as '*I feel like nature is a part of me*' or '*I feel like the natural world is a community to which I belong*' (Restall & Conrad, 2015). It can also foster *relational values*, including responsibility toward, care for and kinship with nature (Britto dos Santos & Gould, 2018). Environmental education also can affect dimensions of the moral sphere like sense of place (Kudryavtsev et al., 2012).

Building upon the previous understanding of values change due to alterations in an individual's life or social context, a *social-ecological change* perspective highlights the role of biophysical context. For example, *shifting baselines* of ecological condition (e.g., fisheries decline) affect how people perceive and value nature (Clavero, 2014; Papworth et al., 2009; Pauly, 1995). Over longer periods of time, shifting baselines have produced "environmental generational amnesia", which posits that as encounters in and with particular types of environment (e.g., old-growth forests) decline or disappear, successive generations will value that environment less (Jones et al., 2020; Kahn & Weiss, 2017). This research also relates to the concept of "ecological grief" or "solistalia," which recognises mourning associated with dramatic ecological change (Cunsolo & Ellis, 2018; Cunsolo & Landman, 2017; Galway et al. 2019). This grief is a result of losing values associated with affected ecosystems and may elicit a painful process of value formation or prioritization changes due to ecological change. Given that broad values tend to be relatively stable, however, we would expect value change to most likely occur with significant social-ecological shifts (Kendal & Raymond, 2019; Manfredo et al., 2017). Recently, Manfredo et al. (2020) demonstrated that in the western US, between 2004-2017, 18 drivers like increasing urbanization and changing socioeconomic factors led to major shifts in values towards wildlife, going from a focus on "domination" to "mutualism" values. Large, calamitous social-ecological events (e.g., floods, hurricanes, pandemics) can yield a sudden change in many or all aspects of an individual's life - they can modify one's social system and self-conception, including values. The dynamic interplay of values and social-ecological change is not fully understood and is likely increasingly relevant in today's rapidly changing world (IPBES, 2019).

References

Aldridge, A. (2007). *Religion in the contemporary world: A sociological introduction*. Polity Press ; Blackwell Publishers.

Amel, E., Manning, C., Scott, B., & Koger, S. (2017). Beyond the roots of human inaction: Fostering collective effort toward ecosystem conservation. *Science*, *356*(6335), 275-279. https://doi.org/10.1016/b978-012091560-6/50013-5

Bardi, A., & Goodwin, R. (2011). The dual route to value change: Individual processes and cultural moderators. Journal of Cross-Cultural Psychology, 42(2), 271-287. https://doi.org/10.1177/0022022110396916

Bardi, A., Buchanan, K. E., Goodwin, R., Slabu, L., & Robinson, M. (2014). Value stability and change during self-chosen life transitions: Self-selection versus socialization effects. Journal of Personality and Social Psychology, 106(1), 131-147. https://doi.org/10.1037/a0034818

Bardi, A., Lee, J. A., Hofmann-Towfigh, N., & Soutar, G. (2009). The structure of intraindividual value change. Journal of Personality and Social Psychology, 97(5), 913-929. https://doi.org/10.1037/a0016617

Barrable, A., & Booth, D. (2020). Increasing Nature Connection in Children: A Mini Review of Interventions. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00492

Becker, G. S. (1976). *The Economic Approach to Human Behavior*. The University of Chicago Press.

Bieling, C., Plieninger, T., Pirker, H., & Vogl, C. R. (2014). Linkages between landscapes and human well-being: An empirical exploration with short interviews. *Ecological Economics*, *105*, 19–30. https://doi.org/10.1016/j.ecolecon.2014.05.013

Bourdieu, P. (1990). *The Logic of Practice*. Stanford University Press. https://doi.org/10.2307/2804264

Bowles, S. (1998). Endogenous Preferences: The cultural consequences of markets and other economic institutions. *Journal of Economic Literature*, *36*, 75–111.

Bratton, S. P. (2008). *Environmental Values in Christian Art*. SUNY Press.

Britto dos Santos, N., & Gould, R. K. (2018). Can relational values be developed and changed? Investigating relational values in the environmental education literature. *Current Opinion in Environmental Sustainability*, *35*, 124–131. https://doi.org/10.1016/j.cosust.2018.10.019

Brown, G., & Brabyn, L. (2012). An analysis of the relationships between multiple values and physical landscapes at a regional scale using public participation GIS and landscape character classification. *Landscape and Urban Planning*, *107*(3), 317–331.

Brown, G., & Raymond, C. (2007). The relationship between place attachment and landscape values: Toward mapping place attachment. *Applied Geography*, *27*(2), 89–111. https://doi.org/10.1016/j.apgeog.2006.11.002

Caduto, M. (1983). A Review of Environmental Values Education. *The Journal of Environmental Education*, *14*(3), 13–21. https://doi.org/10.1080/00958964.1983.9942657

Carr, A. (2004). Mountain Places, Cultural Spaces: The Interpretation of Culturally Significant Landscapes. *Journal of Sustainable Tourism - J SUSTAIN TOUR*, *12*. https://doi.org/10.1080/09669580408667248

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

Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, *2*(3), 619–642. https://doi.org/10.1002/pan3.10128

Chemero, A. (2009). *Radical Embodied Cognitive Science*. MIT Press.

Clavero, M. (2014). Shifting baselines and the conservation of non-native species. *Conservation Biology*, *28*(5), 1434–1436.

Cooper, N., Brady, E., Steen, H., & Bryce, R. (2016). Aesthetic and spiritual values of ecosystems: Recognising the ontological and axiological plurality of cultural ecosystem 'services.' *Ecosystem Services*, *21*, 218–229. https://doi.org/10.1016/j.ecoser.2016.07.014

Coquil, X., Cerf, M., Auricoste, C., Joannon, A., Barcellini, F., Cayre, P., Chizallet, M., Dedieu, B., Hostiou, N., Hellec, F., Lusson, J.-M., Olry, P., Omon, B., & Prost, L. (2018). Questioning the work of farmers, advisors, teachers and researchers in agro-ecological transition. A review. *Agronomy for Sustainable Development*, *38*(5), 47. https://doi.org/10.1007/s13593-018-0524-4

Cotgrove, S., & Duff, A. (1981). Environmentalism, Values, and Social Change. *The British Journal of Sociology*, *32*(1), 92. https://doi.org/10.2307/589765

Cunsolo, A., & Ellis, N. R. (2018). Ecological grief as a mental health response to climate change-related loss. *Nature Climate Change*, *8*(4), 275–281. https://doi.org/10.1038/s41558-018-0092-2

Cunsolo, A., & Landman, K. (2017). Introduction: To Mourn Beyond the Human. In *Mourning Nature: Hope at the Heart of Ecological Loss and Grief*. McGill-Queens University Press.

Daniel, T. C., Muhar, A., Arnberger, A., Aznar, O., Boyd, J. W., Chan, K. M., Costanza, R., Elmqvist, T., Flint, C. G., Gobster, P. H., Gret-Regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R. G., Schauppenlehner, T., Sikor, T., Soloviy, I., Spierenburg, M., … von der Dunk, A. (2012). Contributions of cultural services to the ecosystem services agenda. *Proceedings of the National Academy of Sciences*, *109*(23), 8812-8819. https://doi.org/10.1073/pnas.11147

Deb, D., & Malhotra, K. C. (2001). Conservation Ethos in Local Traditions: The West Bengal Heritage. *Society and Natural Resources*, *14*(8), 711–724. https://doi.org/10.1080/08941920152524909

Dewey, J. (1922). *Democracy and education*. Courier Corporation.

Donohoe, J. (2016). Towards a phenomenology of nature. In B. Bannon (Ed.), *Nature and Experience—Phenomenology and the Environment* (pp. 427–436). Rowman & Littlefield International.

Drenthen, M. (2015). Layered Landscapes, Conflicting Narratives and Environmental Art. Painful Memories, Embarrassing Histories of Place? In D. Havlick & M. Hourdequin (Eds.), *Restoring Layered Landscapes: History, Ecology, and Culture,* (pp. 239–262). Oxford University Press.

Dumont, L. (1980). *Homo hierarchicus: The caste system and its implications.* ((trans. M. Sainsbury, L. Dumont, B. Gulati).). The University of Chicago Press.

Dumont, L. (1986). *Essays on individualism: Modern ideology in anthropological perspective*. University of Chicago Press.

Durkheim, E. (1974). *Sociology and philosophy*. Simon and Schuster.

Ensminger, J. (1992). *Making a Market: The Institutional Transformation of an African Society*. Cambridge University Press.

Escher, R., & Walter-Rogg, M. (2020). *Environmental Performance in Democracies and Autocracies: Democratic Qualities and Environmental Protection* (1st ed. 2020 edition). Palgrave Pivot.

Faith, D. P. (2021). Biodiversity. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2021). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/spr2021/entries/biodiversity/

Fromm, E. (1964). *The Heart of Man* (Harper&R).

Galway, L. P., Beery, T., Jones-Casey, K., Tasala, K. (2019). Mapping the solastalgia literature: a scoping review study. *International Journal of Environmental Research and Public Health*, 16.

Gibbs, J. C., Potter, G. B., DiBiase, A.-M., & Devlin, R. (2009). The EQUIP Program—Social perspective taking for responsible thought and behavior. In *Cognitive behavioral interventions for at-risk youth* (pp. 1–47). Civic Research Institute.

Gilligan, C. (1993). *In a different voice: Psychological theory and women's development*. Harvard University Press.

Gómez-Baggethun, E., de Groot, R., Lomas, P. L., & Montes, C. (2010). The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes. *Ecological Economics*, *69*(6), 1209–1218. https://doi.org/10.1016/j.ecolecon.2009.11.007

Gould, R. K., Ardoin, N. M., Woodside, U., Satterfield, T., Hannahs, N., & Daily, G. C. (2014). The forest has a story: Cultural ecosystem services in Kona, Hawai'i. *Ecology and Society*, *19*(3). https://doi.org/10.5751/es-06893-190355

Graeber, D. (2001). *Toward an antrhopological theory of value The false coin of our own dreams*. Palgrave Macmillan US. https://doi.org/10.1057/9780312299064

Graeber, D. (2001). *Toward an antrhopological theory of value The false coin of our own dreams*. Palgrave Macmillan US. https://doi.org/10.1057/9780312299064

Greenfield, P. M. (2009). Linking social change and developmental change: Shifting pathways of human development. *Developmental Psychology*, *45*(2), 401–418. https://doi.org/10.1037/a0014726

Gregory, R., Lichtenstein, S., & Slovic, P. (1993). Valuing environmental resources: A constructive approach. *Journal of Risk and Uncertainty*, *7*(2), 177–197. https://doi.org/10.1007/BF01065813

Gress, S., & Hall, T. (2017). Diversity in the Outdoors: National Outdoor Leadership School Students' Attitudes About Wilderness. *Journal of Experiential Education*, *40*(2), 114–134. https://doi.org/10.1177/1053825916689267

Grusec, J. E., & Hastings, P. D. (Eds.). (2007). *Handbook of socialization: Theory and research* (pp. xv, 720). The Guilford Press.

Habermas, J. (1991). A Reply. In A. Honneth & H. Joas (Eds.), *Communicative action: Essays on Jürgen Habermas's Theory of communicative action.* The MIT Press.

Hausman, J. (2012). Contingent Valuation: From Dubious to Hopeless. *Journal of Economic Perspectives*, *26*(4), 43-56. https://doi.org/10.1257/jep.26.4.43

Haviland, W. A. (1999). *Cultural Anthropology* (1st Editio). Harcourt Brace & Company.

Heft, H. (2001). *Ecological Psychology in Context: James Gibson, Roger Barker, and the Legacy of William James's Radical Empiricism Resources for Ecological Psychology*. Lawrence Erlbaum Associates, Inc.

Higgins, E. T. (2006). Value from hedonic experience and engagement. *Psychological Review*, *113*(3), 439–460. https://doi.org/10.1037/0033-295X.113.3.439

Hitlin, S., & Piliavin, J. A. (2004). Values: Reviving a Dormant Concept. *Annual Review of Sociology*, *30*(1), 359-393. https://doi.org/10.1146/annurev.soc.30.012703.110640

Inglehart, R. (1995). Public Support for Environmental Protection: Objective Problems and Subjective Values in 43 Societies. *PS: Political Science and Politics*, *28*(1), 57–72.

IPBES. (2019). *Report of the second Indigenous and local knowledge dialogue workshop for the IPBES assessment of diverse conceptualisations of multiple values of nature* (p. 54). IPBES.

Ishihara, H. (2018). Relational values from a cultural valuation perspective: How can sociology contribute to the evaluation of ecosystem services? *Current Opinion in Environmental Sustainability*, *35*, 61–68. https://doi.org/10.1016/j.cosust.2018.10.016

Jones, L. P., Turvey, S. T., Massimino, D., & Papworth, S. K. (2020). Investigating the implications of shifting baseline syndrome on conservation. *People and Nature*, *2*(4), 1131–1144. https://doi.org/10.1002/pan3.10140

Kahn, P., & Weiss, T. (2017). The Importance of Children Interacting with Big Nature. *Children, Youth and Environments*, *27*(2), 7–24.

Keil, F. C. (1922). *Concepts, kinds, and cognitive development*. MIT Press.

Kellert, S. (1993). *The Biophilia Hypothesis*. Island Press.
Kendal, D., & Raymond, C. M. (2019). Understanding pathways to shifting people's values over time in the context of social-ecological systems. *Sustainability Science, 0123456789*. https://doi.org/10.1007/s11625-018-0648-0
Kohlberg, L. (1971). From Is to Ought: How to Commit the Naturalistic Fallacy and Get Away with It in the Study of Moral Development. In T. Mischel (Ed.), *Cognitive development and epistemology*. Academic Press.
Kudryavtsev, A., Stedman, R. C., & Krasny, M. E. (2012). Sense of place in environmental education. *Environmental Education Research*, *18*(2), 229–250. https://doi.org/10.1080/13504622.2011.609615
Lekies, Kristi S., and Thomas H. Beery (2013). Everyone needs a rock: collecting items from nature in childhood. *Children, Youth and Environments* 23(3): 66-88.
Levi-Strauss, C. (1973). Structuralism and ecology. *Social Science Information*, *12*(1), 7–23. https://doi.org/10.1177/053901847301200101
Lichtenstein, S., & Slovic, P. (Eds.). (2006). *The Construction of Preference*. Cambridge University Press. https://doi.org/10.1017/CBO9780511618031
Lönnqvist, J.-E., Jasinskaja-Lahti, I., & Verkasalo, M. (2011). Personal Values Before and After Migration: A Longitudinal Case Study on Value Change in Ingrian–Finnish Migrants. Social Psychological and Personality Science, 2(6), 584-591. https://doi.org/10.1177/1948550611402362
Lumber, R., Richardson, M., & Sheffield, D. (2017). Beyond knowing nature: Contact, emotion, compassion, meaning, and beauty are pathways to nature connection. *PLOS ONE*, *12*(5), e0177186. https://doi.org/10.1371/journal.pone.0177186
Manfredo, M. J., Bruskotter, J. T., Teel, T. L., Fulton, D., Schwartz, S. H., Arlinghaus, R., Oishi, S., Uskul, A. K., Redford, K., Kitayama, S., & Sullivan, L. (2017). Why social values cannot be changed for the sake of conservation. *Conservation Biology*, *31*(4), 772–780. https://doi.org/10.1111/cobi.12855
Manfredo, M. J., Teel, T. L., Berl, R. E. W., Bruskotter, J. T., & Kitayama, S. (2020). Social value shift in favour of biodiversity conservation in the United States. *Nature Sustainability*. https://doi.org/10.1038/s41893-020-00655-6
Manzo, L., & Devine-Wright, P. (2021). *Place Attachment: Advances in Theory, Methods and Applications* (second Edition). Routledge.
Masterson, V. A., Stedman, R. C., Enqvist, J., Tengö, M., Giusti, M., Wahl, D., & Svedin, U. (2017). The contribution of sense of place to social-ecological systems research: A review and research agenda. *Ecology and Society*, *22*(1). https://doi.org/10.5751/ES-08872-220149
Milcu, A. I., Hanspach, J., Abson, D., & Fischer, J. (2013). Cultural Ecosystem Services: A Literature Review and Prospects for Future Research. *Ecology and Society*, *18*(3).
Munn, N. D. (1986). *The fame of Gawa: A symbolic study of value transformation in a Massim (Papua New Guinea) society*. Duke University 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
Muraca, B. (2016). Re-appropriating the Ecosystem Services concept for a decolonization of "nature." In B. Bannon (Ed.), *Nature and Experience—Phenomenology and the Environment.* (pp. 143–156). Rowman & Littlefield International.
Newen, A. (2018). The Embodied Self, the Pattern Theory of Self, and the Predictive Mind. *Frontiers in Psychology*, *9*, 2270–2270. https://doi.org/10.3389/fpsyg.2018.02270
Nolet, V. (2009). Preparing Sustainability-Literate Teachers. *Teachers College Record*, *111*(2), 409–442.
Norton, B. G., & Hannon, B. (1997). Environmental Values: A Place-Based Theory. *Environmental Ethics*, *19*(3), 227–245. https://doi.org/10.5840/enviroethics199719313

Papworth, S. K., Rist, J., Coad, L., & Milner-Gulland, E. J. (2009). Evidence for shifting baseline syndrome in conservation. *Conservation Letters*, *2*(2), 93–100.
Pauly, D. (1995). Anecdotes and the shifting baseline syndrome of fisheries. *Trends in Ecology & Evolution*, *10*(10), 430–430. https://doi.org/10.1016/S0169-5347(00)89171-5
Payne, J. W., Bettman, J. R., & Schkade, D. A. (1999). Measuring Constructed Preferences: Towards a Building Code. *Journal of Risk and Uncertainty*, *19*(1/3), 243–270. https://doi.org/10.1023/A:1007843931054
Piaget, J. (1936). *Origins of intelligence in the child*. Routledge & Kegan Paul.
Raymond, I. J., & Raymond, C. M. (2019). Positive psychology perspectives on social values and their application to intentionally delivered sustainability interventions. *Sustainability Science*. https://doi.org/10.1007/s11625-019-00705-9
Rest, J. (1974). The cognitive developmental approach to morality: the state of the art. Counseling and values 18 (2); pp. 64 - 78
Restall, B., & Conrad, E. (2015). A literature review of connectedness to nature and its potential for environmental management. *Journal of Environmental Management*, *159*, 264–278. https://doi.org/10.1016/j.jenvman.2015.05.022
Rietveld, E., & Kiverstein, J. (2014). A Rich Landscape of Affordances. *Ecological Psychology*, *26*(4), 325–352. https://doi.org/10.1080/10407413.2014.958035
Robbins, J. (2015). Ritual, value, and example: On the perfection of cultural representations. *Journal of the Royal Anthropological Institute*, *21*(S1), 18–29. https://doi.org/10.1111/1467-9655.12163
Rokeach, M. (1973). *The nature of human values*. Free Press.
Rolston, H. I. (1994). Environmental Ethics: Values in and Duties to the Natural World. In *Reflecting on Nature: Readings in Environmental Philosophy*.
Rolston, Holmes. (1982). Are Values in Nature Subjective or Objective? *Environmental Ethics*. https://doi.org/10.5840/enviroethics19824218
Ross, H., Witt, K., & Jones, N. A. (2018). Stephen Kellert's development and contribution of relational values in social-ecological systems. *Current Opinion in Environmental Sustainability*, *35*, 46–53. https://doi.org/10.1016/j.cosust.2018.10.007
Saroglou, V., Delpierre, V., & Dernelle, R. (2004). Values and religiosity: A meta-analysis of studies using Schwartz's model. *Personality and Individual Differences*, *37*(4), 721–734. https://doi.org/10.1016/j.paid.2003.10.005
Satz, D., Gould, R. K., Chan, K. M. A., Guerry, A., Norton, B., Satterfield, T., Halpern, B. S., Levine, J., Woodside, U., Hannahs, N., Basurto, X., & Klain, S. (2013). The Challenges of Incorporating Cultural Ecosystem Services into Environmental Assessment. *AMBIO*, *42*(6), 675–684. https://doi.org/10.1007/s13280-013-0386-6
Scholte, S. S. K., van Teeffelen, A. J. A., & Verburg, P. H. (2015). Integrating socio-cultural perspectives into ecosystem service valuation: A review of concepts and methods. *Ecological Economics*, *114*, 67–78. https://doi.org/10.1016/j.ecolecon.2015.03.007
Schultz, P. W., & Zelezny, L. (2003). Reframing Environmental Messages to be Congruent with American Values. *Human Ecology Review*, *10*, 126–136.
Schwartz, S. H. (1992). Universals in the content and structure of values. *Advances in Experimental Social Psychology*, *25*(C), 1-65. https://doi.org/10.1016/S0065-2601(08)60281-6
Schwartz, S. H. (1994). Are There Universal Aspects in the Structure and Contents of Human Values? *Journal of Social Issues*, *50*(4), 19-45. https://doi.org/10.1111/j.1540-4560.1994.tb01196.x
Schwartz, S. H., & Huismans, S. (1995). Value Priorities and Religiosity in Four Western Religions. *Social Psychology Quarterly*, *58*(2), 88. https://doi.org/10.2307/2787148
Silberman, I. (2005). Religion as a Meaning System: Implications for the New Millennium. *Journal of Social Issues*, *61*(4), 641–663. https://doi.org/10.1111/j.1540-4560.2005.00425.x
Singh, R. K. (2013). *Ecoculture and subsistence living of Monpa community in the eastern Himalayas: An ethnoecological study in Arunachal Pradesh*. *12*(3), 13.

Stevenson, R. B., Brody, M., Dillon, J., & Wals, A. E. J. (2012). *International Handbook of Research on Environmental Education*. Routledge.
Taussig, M. T. (1980). *The Devil and Commodity Fetishism in South America*. University of North Carolina Press.
Te Aho, L. (2019). *Te Mana o te Wai*: An indigenous perspective on rivers and river management. *River Research and Applications*, *35*(10), 1615–1621. https://doi.org/10.1002/rra.3365
Turner, T. (2003). The Beautiful and the Common: Inequalities of Value and Revolving Hierarchy among the Kayapó. *Tipití: Journal of The Society for the Anthropology of Lowland South America*, *1*(1), 11–26.
University of Hawai‘i, SEED Inclusion, Diversity, Equity, Access and Success (IDEAS) Program, He‘eia National Estuarine Research Reserve, University of Hawai‘i Sea Grant College Program, Kua‘āina Ulu ‘Auamo, & Paepae o He‘eia. (2018). *Kūlana Noi‘i (Research Standards)*. http://seagrant.soest.hawaii.edu/kulana-noii/
Vining, J., & Merrick, M. S. (2012). Environmental Epiphanies: Theoretical Foundations and Practical Applications. In *The Oxford Handbook of Environmental and Conservation Psychology*. https://doi.org/10.1093/oxfordhb/9780199733026.013.0026
Weber, M. (1946). *Essays in sociology*. Oxford University Press.
Whittaker, D., Vaske, J. J., & Manfredo, M. J. (2006). Specificity and the Cognitive Hierarchy: Value Orientations and the Acceptability of Urban Wildlife Management Actions. *Society & Natural Resources*, *19*(6), 515–530. https://doi.org/10.1080/08941920600663912
Wilson, E. O. (1984). *Biophilia*. Harvard University Press.
Zahn, M. J., Palmer, M. I., & Turner, N. J. (2018). “Everything We Do, It’s Cedar”: First Nation and Ecologically-Based Forester Land Management Philosophies in Coastal British Columbia. *Journal of Ethnobiology*, *38*(3), 314. https://doi.org/10.2993/0278-0771-38.2.314

Annex 2.17 Spiritual sovereignty as a conservation strategy: the case for an indigenized framework

> *Hu'tchni'ng xe'xe-s etse Lha'qte'Mish. Elhtel'nex xe'chi't-s the hu'tchni'ng xe'xe-s ske'lot'ses, i net'se hu'tchni'ng-s et'se, i Ahh'Tse'le'ni, i AhhTse'lu'lh, i AhhTse'Kw'e*

It is a philological realm of indigenous alterity altogether foreign to Western-based scientistic thinking: elhtel'tenexw, a'aha'qe'xie, xa xalh xechgning, schelangen, sxwo'l'qwe, and tenx. These colligated indigenous concepts both draw from and signify a force field of an unbroken interrelatedness of elemental forces in nature from the Lummi Indian origin-time unity of Xa'els (the Changer). They are part of an epochal perspicuous, sovereign and inspirited ancestral worldmaking process. The framework for this ancient worldview includes a distinct cosmology and cosmogony, deep cultural layering, first principles and schemas, rigorous categories and processes of signification, and evidentiary protocols that manifest in surface structures and manifold évènementiel practices. It is a perspicuous, coherent and legitimate framework for establishing the facticity of being embedded in nature from an indigenous ideological center of truth. It was also deployed in the Lummi Nation's defense of xwe'chi'eXen in a historic campaign that brought into sharp relief contrasting worldviews and value prioritizations, asymmetric power relationships, and the existential threat of disorienting culture-change.

> *My Lummi name is Sle-lh'x elten. My English name is Jeremiah Julius. I am a Lummi Indian, a fisherman and a crabber, and a descendant of Yakship who carried on our way of life at xwe'chi'eXen [Cherry Point] that dates back thousands of years. I am a student of history and of the Bible who understands the perils of a fool's deceit, or of losing sight of the sacred.*
>
> *And I am a child of the Salish Sea.*
>
> *I know that our ancestors were living at xwe'chi'eXen ten thousand years ago. Our lifeway grew there after the Great Flood. Over countless generations our ancestors were born, lived, died there. The water and the land at xwe'chi'eXen is their final resting place; the hallowed ground, as our Chief tsilixw said, of our "Ancient Ones." Another Chief from another time—Chief Seattle—said much the same thing in a letter to Washington's Territorial Governor Isaac Stevens: "The ashes of our ancestors are sacred, and their final resting place is hallowed ground."*

The tribe's defense of xwe'chi'eXen followed on two tracks: treaty rights and the National Historic Preservation Act. The victory of the Lummi Nation on both tracks sent shockwaves across the United States, empowered Native communities, and reconfigured a legal and administrative landscape. The outcome, however, was by no means certain with the Lummi, the allied tribes and NGO's facing a battle-train of powerful multinational and international corporate interests with Congressional allies.

> *I am no stranger to the corporate world. I left the community as a young man for California where I lived and worked, making a very good living as an entrepreneur. But as time went by I felt the presence of an absence. I had what is said to be the good life, but something essential, something vital was missing. I knew I had to come home and resume my life as a fisherman living among my people. So fishing is my livelihood, yes, but it is much more than that. It is a way of life that sustains and nurtures us—mind , body, spirit and soul—and connects us to our ancestors who lived on this land and fished these waters for countless generations. When I go out into the San Juan Islands to fish I can envision and sense the presence of our ancestors with their reef-*

nets and the villages on the undisturbed shorelines. We are the Salmon People, the original people of the Salish Sea.

The 18,000-acre Lummi reservation is located in northwest Washington State near the Canadian border. The traditional Lummi territory recognized by the tribe, historians, and the United States Courts and Congress extends north, past Cherry Point (xwe'chi'Exen), to the Canadian border and westward through the San Juan Island archipelago in the Salish Sea. The Lummi Nation depends on the salmon fishery as a lifeline for their lifeway, as did their ancestors who lived in the village area known as Xwe'chi'eXen. The Lummi Nation unconditionally opposed the construction of a terminal at xwe'chi'eXen that would diminish their treaty rights, further denature the Salish Sea, and cause irreparable damage to one of the oldest, largest, and best documented archaeological sites in the Pacific Northwest.

I was witness as a Lummi tribal leader to the attempt to build the largest coal terminal in North America at xwe'chi'eXen. I was deeply offended by the disregard, disrespect, and deceptions of the project sponsors: Pacific International Terminals (PIT), S.S.A. Marine, Carrix, Inc., FRS Capital Group, Goldman-Sachs, Burlington Northern Railroad, Berkshire-Hathaway, Peabody Energy, and the Chinese Overseas Shipping Company. Their project, and the manner in which they conducted themselves, brought dishonor upon them and conflict into our community. They sowed and exploited hurt feelings and divisions among our families and lied to our leaders. I was reminded in listening to them of George Orwell's description of doublethink: "to be conscious of complete truthfulness, while telling carefully constructed lies." As one of our elders said: 'They relied on consultants. We relied on our Ancestors.'

The permitting process for the project began in earnest in 2011 with the Corps of Engineers (Seattle District) as lead agency. The terminal would occupy the entire 1,105-acre xwe'chi'eXen landscape and ship 48 million tons of coal annually to China. The terminal would service 407, 1000-foot long Cape-sized vessels per year with each one carrying 250,000 deadweight tons of coal from the terminal at xwe'chi'eXen. The ships would pass over tribal usual and customary fishing grounds in the Salish Sea, up through the turbulent waters of the Bering Sea (without escort), and down a long arc to Japan where the coal would then be transported to China. The coal would be sent by rail to xwe'chi'eXen from the Powder River basin in Montana by 18, 1½ -mile long uncovered coal trains arriving and departing daily from the terminal for decades.

The project posed a clear and present danger to the salmon fishery and the Lummi Nation's treaty fishing rights. It also would result in irreversible damage to the physical integrity and spiritual sanctity of the 3,500-year old Lummi ancestral village of Xwe'chi'eXen along with other heritage sites and resources that go back at least 9,500 years, including burial areas, ancient reef-net fishing sites and stone fish traps, and underwater cultural properties. While tribal attorneys prepared to defend treaty fishing rights Lummi traditional knowledge-keepers, working with experts such as Dr. Thomas King, pioneered a bold application of the 1966 National Historic Preservation Act.

Xwe'chi'eXen is not just a parcel of land or well-defined boundaries established by archaeologists. That is a measure of value most convenient to the government ,academics, and corporations. For us, xwe'chi'eXen is one interconnected, indivisible cultural and spiritual landscape from the marine waters where we know there to be ancient reef-nets, and across the upland to the interior of this ancestral landscape. Our ancestors lived at xwe'chi'eXen when Abraham, Isaac, and Jacob wrote their sacred texts, and when the Jews made their heroic Exodus from Egypt. The proposal to bury under mountains of coal a 3,500 year old village site and desecrate a sacred landscape was a violation of all that is good and true of the human spirit.

The Corps of Engineers determined that the project's Area of Potential Effect on cultural resources was limited to a small area in the immediate vicinity of the proposed dock. In addition to this narrow delineation, it would only consider physical impacts on state-registered archaeological sites. The tribe rejected this narrow interpretation of the agency's responsibility under the National Historic Preservation Act. Instead, after months of consultation it received permission from the lead agency to submit a traditional cultural properties (TCP) report for the xwe'chi'eXen landscape and seascape based on the values of the Lummi people.

The framework for the traditional cultural properties report was based on the cosmological ordering of a'ahs'qe'xie. A'ahs'qe'xie is a tribal articulation of the interiority and agency of intangible (nonmaterial) properties that connect and give meaning to the properties of material objects-of-knowledge. A'ahs'qe'xie expresses a spiritually-based 'felt-sense' that grasps, apprehends, and apperceives the nature of interiority and the ontology of the Personhood in a metamorphic world. Each of these material and non-material properties are indissolubly and indivisibly linked to all the others like strands of a spider's web. The slightest disturbance of any one strand resonates to varying degrees and in accordance with different interior properties and presences across the entire xwe'chi'eXen landscape-seascape signified by a'ahs'qe'xie . The a'ahs'qe'xie landscape-seascape is defined not only in terms of topographical space, i.e., distance between objects-of-knowledge. It is also understood in terms of relational space that connects spatialized objects with each other, and, through embedded and dividuated Personhood, to a cosmological unfolding going back to—but is contemporaneous with—the unity of Elhtel'tenexw and the epochal Origin before-time of the Changer (Xa'els).

> *A colleague of mind introduced me to the idea of "gestalt," that applies to xwe'chi'eXen. The xwe'chi'eXen landscape and seascape are an indivisible functional unit "with properties not derivable solely by summation of its parts." It is not correct to represent the value of one site without full knowledge of its tangible and intangible relationship to each of the other sites in the xwe'chi'eXen ancestral landscape and seascape. We need to know the full extent of cultural and spiritual damage in terms of our ancestral knowledge. When we submitted the TCP we told the Corps of Engineers—our Trustee and guardian of our treaty rights—that their obligation to honor the report is our right, our inherent right, our sovereign right.*

The consequences of the report went beyond refuting the original delineation of the cultural impacts of the proposed terminal, or even the listing of the entire xwe'chi'eXen landscape-seascape based as eligible for the National Register of Historic Places. The report paved the way for interrogating the nature of "nature" through a framework of indigenous alterity. Spiritual sovereignty as a conservation framework is qualitatively different from the motive, aim, form, content, and function of Traditional Ecological Knowledge. Instead, the prioritization of a'ahs'qe'xie brings specificity to the pure-truth content of an overarching pious sense of multiplicative, multidimensional, and continuous culturally nuanced kinship relations with nature. It also exposes divergence between it and the conventional prioritizations of environmental assessment along at least three planes: Time, Space, and Personhood.

Table SM2.13 Conventional prisonizations of environmental assessment

Domain of Values	Prioritizations of Environmental Assessment	Prioritizations of A'ahs'qe'xie
Time	Serial/Desanctified	Contemporaneous/ Kairotic
Space	Neutral	Ensouled
Personhood	Bounded/Unembedded/Particular	Porous/Embedded/Dividuated

The relationship of Past Time and Present Time is one of the defining characteristics of a'ahs'qe'xie. Time is prioritized as a lived, interanimated relation that suggests a cyclical time that is periodically regenerating itself. The Past is always present, and the Present recollects that portion of the Past that announces what will be true for times ahead for it is cyclical in nature, not serial. The focus is on the spatial contours of Time in which the distant past is, on the one hand, distinguished from the present, but, on the other, is not only carried up to the present but carried into it as well. This prioritization of Time is either misrepresented, dismissed or made invisible by the prioritizations the serial and desanctified Time that is encoded in the conventional environmental process.

The preeminence of spatialized, extended, and empowered landscapes is another defining characteristic of a'ahs'qe'xie world-making. The taken-for-grantedness of the property of ensouled and extended space in a'ahs'qe'xie is central to the indigenous narrative for xwe'chi'eXen. Contrary to the prioritization of the conventions of the environmental assessment process, this landscape-seascape` is more than a backdrop or a neutral, empty container, frame, or matrix filled with inanimate objects. It is animated in a manner that subsumes localization, dissolves space and reconstructs time, and is empowered with the capacity of volition and intentionality. It is an eventful, relational space with sacred associations, collective and storied memories, accumulated private knowledge, and the agency of the Ancient Ones.

Presences in the a'ahs'qe'xie lifeworld include both the sensible and the supersensible, as well as generalized forces of and in nature, and are in no case apart from the percipient. Instead, they are known in terms of Personhood and a sense of a dividuated kinship that engages a reciprocal relatedness of mutual sympathy between existences in the a'ahs'qe'xie lifeworld. This belief in a simultaneous, symbiotic, sympathetic, and reciprocal existence with the Personhood of nature is integral to the spirit of a'ahs'qe'xie in the context of the unfolding of Xa'els' creation. In contrast to the individuated and disembedded postmodern self, this field of relatedness helps to constitute and situate the person emotionally to exist in relational space which is porous to elemental forces. What is most significant is not the 'I' or the 'We', but the porous 'Us' of the interspace that appears between the person and other presences. This sensibility of embeddedness is a constituent of a'ahs'qe'xie within which particular features of the landscape-seascape show up in the sense that they have. This porous sense of embedded Personhood is made invisible or deemed irrational by a bounded, aesthetically distanced, individualized consciousness of the postmodern 'I-game' that attends to the materialistic determinism characteristic of conventions of the environmental assessment process.

> *Our people continue to have a strong felt-sense of association and spiritual connection with the landscape and seascape at xwe'chi'eXen. It is an archive that chronicles our deep history and our identity as a people, and for which we have a 'xa xalh xechnging' [sacred obligation]. We spoke many times with the Corps and others about the intangible properties of this landscape. These properties are not only those you can see or touch. Do we know these "properties? Yes. Is it appropriate to describe them to outsiders? That is up to our elders. This is private knowledge we have and it is central to who we are as a people from the place known to us and our Ancient Ones*

as xwe'chi'eXen. It took all of us—people of all faiths, lifeways, and walks of life—focusing on the force that brings us together to protect, forever, this sacred ground. Our Jerusalem. Our hallowed ground.

The four-year local, regional, national and international campaign for xwe'chi'eXen was organized and facilitated by the Lummi Nation and involved an alliance of tribes and intertribal organizations whose support was steadfast throughout campaign. In 2011 the Lummi Nation established its xwe'chi'eXen Operational Team that worked along six interrelated pathways, each with its own nexus with the issue: culture and history, politics and policy, technical and administrative, jural-legal, public relations and community education, and partnerships and institutional support. Over the course of this grass roots to grass tops campaign tribal leaders from across the Pacific Northwest along with their strategic core teams met frequently with the xwe'chi'eXen Operational Team (XOT), the business end of the strategic spear. The XOT and the allied tribes exchanged information, critiqued progress along each of the strategic pathways, worked to keep ahead of the tactics and strategies of the project proponents, and, through the participation of the elders, stayed close to the Spirit watching over the effort. Instinctively employing the OODA loop technique (Observe, Orient, Decide, and Act) the tribes evaluated and, in some cases, reset their strategic posture and platforms along with the operational linkages.

In addition to obtaining dozens of tribal Resolutions endorsing its position, the tribe also secured the endorsement and technical support of the Affiliated Tribes of Northwest Indians that includes the participation of fifty-seven tribes from southeast Alaska, Washington, Idaho, western Montana, Oregon and northern California. The tribe's position was further enhanced with the endorsement of the National Congress of American Indians, the oldest, largest, and most representative intertribal body in the United States. By 2014, all but a handful of tribes across the United States endorsed the tribe's position that the project posed a threat to sacred ground and Native lifeways and was an unacceptable violation of treaty rights. It was for Indian Country an existential moment of truth. This rising tide of Native opposition in the Pacific Northwest and across the country was not lost on Members of Congress or the top levels of the lead agency.

Local, regional, and national environmental organizations were in every way supportive. At the request of the tribe, they positioned themselves beside or behind the tribe on the issue but did not get in front of the campaign. In doing so, they gained a new strategic insight on how treaty rights can pave the way to environmental victory. This alliance set the precedent for indigenous-led environmental campaigns across the Pacific Northwest. The tribe also reached out to the faith-based community at the local level and, through intermediaries, to national organizations. Unlike the environmental organizations, the faith-based community was more divided in its support. In some cases their congregants did not necessarily oppose the terminal based on environmental or treaty-related issues. Working through the issue with faith-based liaisons, the tribe found common ground based on the threat of the project to the spiritual significance of xwe'chi'eXen. In the end their vocal public support was critical in gaining public interest and support in many unexpected quarters.

The campaign also engaged the universal language of the arts through ceremonies of belonging. During each of four years (2013-2016) Lummi carvers created and transported western redcedar totem poles to public gatherings across the United States and Canada. The totem poles personalized the issue with ceremony, enchanted the message with indigeneity, and inspired an understanding that this was not just a political or legal—or even strictly indigenous—matter. It was the issue of moral high ground. The forty-five totem pole events attracted conventional and social media coverage and the attention of millions of Americans. These artful events and their ceremonies asserted the historicity of governmental and corporate injustices, the inviolability of the treaty, the enduring relevance of trust, fairness, and respect, and the moral high ground of hallowed ground.

The range, reach, velocity, ferocity, and ingenuity of this opposition caught the project proponents entirely off guard, leading one of its original investors, Goldman-Sachs, to pull out of the project in 2014. Despite their access to nearly unlimited financial resources, the proponents proved to be less adaptive or nimble than the tribes, lacked the tribe's public relations acumen or its depth and breadth of scientific expertise, demonstrated an outsider's lack of understanding of the Pacific Northwest citizenry on this issue, and were internally conflicted. They also tried repeatedly but failed to misinform, bribe, coerce with SLAPP suits (strategic lawsuit against public participation), or otherwise apply the injurious tactic of 'divide and conquer.' None of this predictable behavior was lost on the tribes.

It is now broadly understood that the successful campaign for xwe'chi'eXen was about more than a coal terminal. The element of indigeneity has now become a guiding force in responding to another existential threat: climate change. For the tribes and its allies, the xwe'chi'eXen campaign made it clear that victory in such matters is not a formula-magic. Planning, resources, expertise, strategy, alliances, and public support are necessary not sufficient. There is no substitute for passion, sacrifice, inspirited and inspired simpatico among dedicated and committed individuals, and for the extra-added value dimension of indigeneity.

> *This story just came to mind. They are the words of another Lummi fisherman who was talking about the salmon and the sacred. His words might be of interest to you, the reader, and perhaps inspire an understanding of the intangible connections we feel as a people to our land, to our waters, to the Creation, to our ancestors, to each other, and to those still to come:*
>
> *The Salmon People aren't hardly here no more. We've had some good years, but not many. Maybe they will come back. We need to talk to them. We need you, Salmon People; life-giving resource. You gave up your lives so we can live. It is important for our people, about who we really are. We sit in the lap of Mother Earth learning all there is to learn…not all at once, but built up over a lifetime, every day. We need to keep learning. To never quit learning.*