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An inclusive typology of values for navigating transformations towards a just and sustainable future☆

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Achieving the intertwined goals of justice and sustainability requires transformative changes to meaningfully engage diverse perspectives. Therefore, scholars and policymakers need new ways of recognising and addressing nature's multiple values across cultures, disciplines and other knowledge traditions. By reviewing academic publications, policy documents and Indigenous and local community sources, we developed an inclusive typology of nature's values to clarify value concepts and guide their consideration in decisions. Through case studies, we illustrate how navigating 'horizontal' and 'vertical' interactions within and across this typology can help confront plural-value challenges, such as enhancing inclusive participation in environmental research and practice, and effective management of socio-environmental conflicts. We conclude by exploring how this typology of values can further leverage transformative change in other decision-making contexts.

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☆ Leveraging the multiple values of nature for transformative change: Insights from the IPBES *Values Assessment*.

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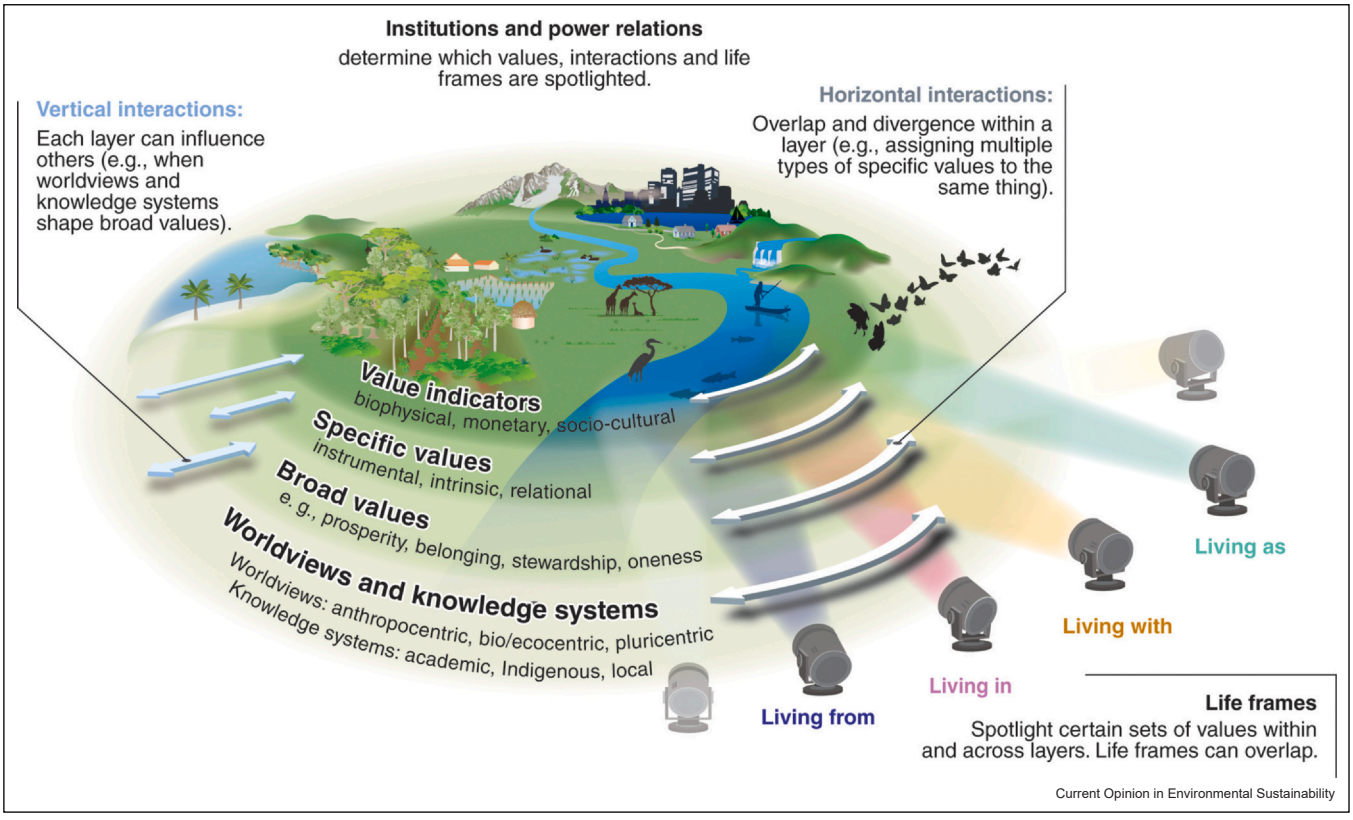
Introduction

Previous global agreements to address the environmental crisis have largely failed, partially because decisions continue to prioritise a narrow set of values of nature and nature's contributions to people [1,2]. Environmental decision-making is often discipline-specific (e.g. wilderness areas to protect biodiversity and ecosystems) or interest-based (e.g. development proposals to enhance certain sector's economic profit or growth) [3], impeding comprehensive valuations of stakeholder perspectives [4] and potentially favouring those with more discursive or structural power [5–7]. Other papers in this special issue address additional challenges related to assessment and uptake of the diverse values of nature (e.g. integration of qualitative and quantitative data) [8,9]. To overcome these challenges, transformative governance needs to be inclusive, empower marginalised communities and attend to diverse ways of knowing and relating to nature [10–12]. This is not easy; even whilst the recent Kunming–Montreal Global Biodiversity Framework (GBF) calls for fully integrating nature's multiple values into decisions [13], researchers and policymakers still lack tools to identify and incorporate them into transformation processes [11,14–16] that shift practices towards justice and sustainability [17].

As part of the *Methodological Assessment of the Diverse Values and Valuation of Nature* (hereafter, *Values Assessment*) [2], commissioned by the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), we reviewed academic publications, policy documents and Indigenous and local community sources regarding value concepts [4,18] to create a typology that is inclusive of many different disciplines and knowledge systems, although it cannot be comprehensive of all of epistemologies and ontologies. We focused our searches on different ways of conceptualising and classifying values. Uniquely, this typology engages values across different scholarly and management domains relevant for sustainability transformations. This cross-epistemic approach serves as a foundation for recognising and operationalising nature's multiple values in research and decision-making. We identified four key levels of meaning associated with values, constituting the typology's 'layers': worldviews and knowledge systems, broad values, specific values and value indicators. To comprehend how people prioritise values, we present the 'life frames' that relate certain value sets to different ways of being/living in the world. Furthermore, we illustrate how navigating the typology's 'horizontal' and 'vertical' interactions can help meet relevant sustainability challenges, such as achieving inclusive environmental research and practice and effective management of socio-environmental conflicts [19] (Figure 1). We conclude with recommendations for applying the typology to four leverage points of transformative change for just and sustainable futures.

Commonly, environmental scholarship and policy consider nature based on Western science's generalised definitions and notions with respect to biodiversity, ecosystems and biomes. Here, we seek to reflect more plural perspectives, including non-Western understandings, such as webs-of-life, Mother Earth or the more-than-human world. Many cultural groups, including diverse Indigenous peoples and local communities, Eastern philosophies and others, do not have an encompassing term or concept for 'nature' in general. Many groups also do not separate it as part of a human-nature dichotomy [20]. When referring to nature, therefore, we embrace diverse forms, including, for instance, 'natural' entities and features (e.g. species, communities, rivers, forests and mountains), but also interconnected 'human-nature' entities (e.g. sacred sites, human–nonhuman kinship systems, urban green/blue space and cultural landscapes). Hence, the typology helps operationalise the IPBES conceptual framework and expand the notion of nature beyond the ecological realm [21,22].

Figure 1



An inclusive typology of the diverse values of nature**.** Four conceptual value layers can be distinguished: i) worldviews and knowledge systems, ii) broad values, iii) specific values and iv) value indicators. Four non-mutually exclusive life frames are depicted here: the grey, unlabelled spotlights represent other possible framings of people–nature relationships. Different value types are exemplified within a given layer (adapted from [2]).

An inclusive typology of nature's values

The typology includes the following 'layers':

a) *Worldviews* are the 'lenses' through which individuals and groups perceive, interpret, inhabit and modify the world [23,24]. Whilst many worldviews exist, each reflecting distinct ontologies and epistemologies, here we focus on how they relate to nature and human-nature relationships. We acknowledge that perspectives with regard to nature are not independent of broader worldviews (e.g. those grounded in traditional, post-modern or contemporary spiritual understandings) [25]. Drawing on the IPBES *Values Assessment*, we focus on nature-related aspects of worldviews. The assessment showed that worldviews are strongly tied to cultural identities and different philosophies of good living, as well as different religious views and cultural practices [4]. Overall, worldviews can be clustered into three orientations regarding people–nature relationships. Anthropocentric worldviews prioritise humans [26–28]; 'strong' anthropocentrism emphasises human superiority over other species, and 'weak' anthropocentrism acknowledges human dependence upon nature [26,29]. Bio/ecocentric worldviews place importance on living beings (i.e. biocentric) or nature as a whole (i.e. ecocentric) as having inherent worth in themselves [30]. Finally, pluricentric worldviews, an emerging concept, focus on reciprocal, intertwined and embedded relationships between humans and other beings, and nature's elements and processes (i.e. with no centre) [14]. Worldviews are connected with *knowledge systems*, defined as cumulative bodies of knowledge, practices and beliefs. Knowledge systems have different classifications (e.g. academic, Indigenous and local), but all evolve by dynamic, adaptive processes, being learned or transmitted within and across generations via culture and direct experience with nature.

b) *Broad values* are life goals and guiding principles, including what constitutes desirable people–nature relationships [4]. They transcend specific contexts, but arise from particular worldviews and knowledge systems (informed by cultural settings and practices, languages and places) that affect individuals and groups [31]. Broad values encompass what are sometimes called 'principles', 'human', 'held' or 'transcendental' values [32,33].

c) *Specific values* are judgements regarding the importance of something in 'specific' contexts, including biodiversity,

ecosystems, people–nature relationships or human well-being [4]. These are sometimes called 'assigned' or 'contextual' values [3]. It is well established that specific values can be instrumental, intrinsic and relational, but in the literature, these categories sometimes have multiple, overlapping meanings (*ibid*). Instrumental values include things important as a means to an end or to satisfy preferences (usually for humans) [34]. At least in principle, they are substitutable [35]. Intrinsic values include something's worth as an end in and of itself, something's value independent of reference to people as valuers and nature's inherent moral value regardless of human importance or usefulness (i.e. right to exist) [36,37]. Relational values encapsulate meaningful relationships between people and nature and among people (including across generations) through nature [35,38]. Consequently, recent scholarship provides new 'human-nature relational models' that account for different cognitive or disciplinary frameworks of relating with nature [39].

d) *Value indicators* are quantitative measures (e.g. hectares, money and indices) or qualitative descriptors (e.g. expressions, arguments and stories) of specific values [3]. Both qualitative and quantitative indicators can be used to express and integrate different values [9]. Indicators can be categorised as biophysical, monetary or sociocultural [2]. In some typologies, health and Indigenous and local knowledge are also considered additional categories of indicators [4,21,40], but here they are recognised as cross-cutting domains.

These value 'layers' are not static; the *life frames* spotlight how different ways of being/living in the world concomitantly prioritise value sets across the typology [4,28,37,41] (Figure 1). *Living from* nature conceives nature as resources contributing to human needs and wants. *Living in* nature focuses on place(s) where one develops physical and symbolic relationships to specific places. *Living with* nature sees nature as other(s) with their own interests and agency (e.g. wildlife, ecological processes and other-than-human beings). Unlike the previous frames, *living as* nature refers to 'nature' [21] as a physical, mental and spiritual constituent of self (i.e. rejecting the people–nature dichotomy). *Living as* nature is a generalisation of diverse frames of oneness with nature [28], but recognises that many people do not conceptualise 'nature' in the dichotomous Western sense. Rather, it seeks to highlight non-dualistic, reciprocal understandings of the people and 'nature' relationship. *Living as* nature sees human-nature relations as non-dual, such as in the concepts of Pachamama or the web of life where humans and nature are seen as part of an extended community. This frame also challenges abstract value concepts, seeing them as embodied, reciprocal and dynamic, reflected in, for example, understandings of personhood of rivers, deep ecology, the land ethic and affordances in psychology [4]. The four life frames are not mutually exclusive.

Whilst worldviews represent the ways, perspectives or metaphorically the 'lenses' through which people understand and interpret the world, the life frames concept is a way to organise how people, policies and institutions 'spotlight' different sets of values based on a combination of factors regarding how they prioritise certain ways of being, living and relating to nature in its broadest sense [4,37]. Whilst different worldviews may prioritise certain life frames, they do not map 1:1 onto worldviews. For example, someone with a predominantly bio/ecospheric worldview will not just *live with* nature, but may also express values associated with the other life frames in different contexts. In this way, they are more flexible, but at the same time useful to understand how certain values are highlighted (or ignored) in particular decision-making contexts, thereby informing the design of integrated valuations.

Navigating the value typology's 'horizontal' and 'vertical' interactions

The way people express values is complex. Therefore, beyond creating a list of values, this typology's utility for transformative change lies in navigating its 'horizontal' and 'vertical' interactions within and among its value layers and types (Figure 1, Table 1). First, identifying *horizontal interactions* helps consider a spectrum of value types in a particular study or decision, including how people express divergent or overlapping values for the same elements or entities (e.g. biodiversity, ecosystems). For example, relational values referring to reciprocal obligations with other species may overlap with the justification of intrinsic value attributed to them, or similarly, there can be divergence between aspects of bio/ecocentric and pluricentric worldviews concerning the degree to which people are understood as part of nature [4]. Meanwhile, *vertical interactions* arise as when broad values emerge from worldviews and subsequently express contextually as specific values measured by appropriate indicators. For example, those with strong anthropocentric worldviews likely privilege utilitarian broad values, consider instrumental specific values and assess monetary cost–benefit indicators of sustainability. However, using money to indicate value may fail to capture the importance of intrinsic values and undermine the broad values espoused by those with bio/ecocentric or pluricentric worldviews. The life frames provide an effective way to cluster sets of values horizontally and vertically across diverse disciplines [4], providing a useful aid for organising and communicating the complexity of the diverse values of nature.

Below, we analyse two research/policy case studies to demonstrate how understanding the interactions within and among the typology's value layers and types can help meet the real-world challenges (e.g. GBF Target 1's participatory-integrated biodiversity-inclusive spatial

planning, Target 4's minimise human–wildlife conflicts or Target 29's full, equitable, inclusive, effective and gender-responsive representation and participation) of enhancing inclusive approaches to environmental research and practice and managing socio-environmental conflicts.

Enhance inclusive environmental research and practice

Horizontal interactions: Providing opportunities to express diverse value types within a layer is essential to achieve diverse stakeholder inclusion and overcome the persistent model that separates science/policy and knowledge production/decision-making [33]. For example, identifying horizontal interactions of specific values shows the diversity of stakeholder interests [4,42], as exemplified by an experience of inclusive management in India for the Himalayan wolf (*Canis lupus chanco*). Whilst shepherds persecuted wolves based on instrumental (e.g. property, livestock) and relational values (e.g. sense of security, cultural symbolism), conservationists justified their protection based on intrinsic values (e.g. biodiversity, charismatic species and ecosystem function) [43]. Recognising this suite of specific values allowed these actors to work together to decommission traditional wolf traps, pits called *shandong*. Achieving diverse stakeholder involvement implied acknowledging and respecting both divergent and overlapping specific values about wolves [43]. Doing so also allowed accommodating villagers' concerns via livestock insurance and construction of predator-proof corrals [43].

Vertical interactions: Sometimes, however, inclusivity requires engaging other layers of value. For example, moving vertically across the typology helps grasp how specific values are partially shaped by worldviews. In large part, the inclusive wolf conservation coalition appealed to many Buddhists' pluricentric worldview of embodied relationships between sentient beings and broad values of empathy, freedom from suffering for all beings, compassion and non-violence [44]. Yet, whilst in Buddhist villages, positive attitudes towards wolves were associated with religiosity, being female and higher education, many people still saw wolf hunting as an important livelihood and a culturally important means of protecting livestock (i.e. anthropocentric worldview) [43,44]. Therefore, accommodating these different perspectives was key to including an array of non-traditional participants (e.g. local residents, religious leaders and politicians) in actions to neutralise some *shandong* sites by creating an escape passage for trapped animals. However, rather than demolishing these structures, a *stupa* (Buddhist religious symbol) was built at decommissioned traps to activate broad values of compassion towards all life. Navigating this 'vertical' value interaction allowed bridging understandings of wolves. Such cross-layer integration also appears in the multiple life frames at play, which highlights that fairly representing stakeholders in research and policy-making necessitates considerations beyond methodological issues within a layer (e.g. integrating biophysical, monetary and sociocultural indicators) or seeking to change others' values [4]. Instead, the ability to also link multiple worldviews and broad values with specific values and indicators can promote inclusive processes for justice and sustainability.

Manage socio-environmental conflicts

Horizontal interactions: Divergent value prioritisation within a typology layer can lead to stakeholder conflicts; recognising horizontal interactions can help manage these discrepancies by identifying commonalities within otherwise-polarised situations. For example, the 1990s 'timber wars' in the U.S. Pacific Northwest centred on whether old-growth forests should be logged to generate income and jobs, or conserved to protect (among other species) the endangered northern spotted owl (*Strix occidentalis caurina*). Both loggers and conservationists believe the forest is important, but expressed different specific values. Logging was tied to instrumental values (e.g. lumber, income) and some relational values (e.g. identity based on a natural-resource livelihood, place-based connections). Conservationists considered nature largely via intrinsic values (e.g. protect owls and their habitat for their own sake) and other relational values (e.g. physical and mental relationships with the forest, identity based on symbolic value of 'pristine nature') and some instrumental values (e.g. water and climate regulation) [45]. Whilst initially portrayed as an irreconcilable conflict, a more nuanced analysis of these specific values demonstrates common ground [46]. Both groups expressed relational-specific values related to care and responsibility for the forest, despite different ways of acting upon them [45]. After the conflict dissipated somewhat, collaborative forest management groups formed, including environmental activists, loggers, forest industry representatives, managers and community members, to provide venues to constructively engage this suite of values and re-enforce shared ones. The process ultimately built trust and agreement on some mutually acceptable management actions in situations previously dominated by conflict [47].

Vertical interactions: Framing the 'timber wars' only as a divergence of value types at one layer (i.e. timber's instrumental values vs. owls' intrinsic values) neglects more profound roots of conflict. For some stakeholders, the disagreement was fundamentally about how forests and their management are conceived [45]. Accordingly, the expression of particular specific values should be understood as a partial reflection of contrasts between an anthropocentric worldview's focus on utility-oriented broad values such as security and prosperity (expressed as the instrumental values of timber and jobs) and a bio/

Table 1

Summary of examples navigating the 'horizontal' and 'vertical' interactions within and among the typology's value layers to confront two environmental research and policy-making challenges.

		
Enhance inclusive approaches to environmental research and practice	An ability to identify a range of specific values about wolves and their management allowed a conservation coalition between both conservationists and pastoralists [43].	Awareness of how different value layers shape one-another improved stakeholder engagement beyond traditional alliances. By appealing to Buddhist broad values in the context of wolf management, it was possible to include religious leaders, authorities and other community members [43].
Manage socio-environmental conflicts	Recognising not only differences, but also overlaps in values within a layer, clarifies positions to help ameliorate contentious situations, such as when loggers and conservationists focus not only on differences regarding instrumental versus intrinsic values, but also shared relational values of a forest [47].	An understanding of relationships among value layers helps determine the underlying reasons of a conflict, such as when logging is not only a difference of which values to prioritise, but whose worldviews and broad values are considered in decision-making. Finding the roots of conflicts can enable better consideration of mutually acceptable actions or reframing the problem in constructive ways [45].

ecocentric worldview's emphasis on sustaining broad values such as the right of 'wild' nature to persist without human interference (expressed as the intrinsic value of owls and old-growth forests). Different life frames of nature provide a helpful way to visualise or communicate these interactions, whereby loggers *live from* nature (combining anthropocentric worldviews, utility-oriented broad values and instrumental and relational-specific values), and meanwhile environmentalists *live with* nature (combining bio/ecocentric worldviews, wilderness-oriented broad values and instrumental and relational-specific values). Importantly, other ways of framing were not reported in predominant portrayals of the conflict, even though other initiatives were taking place. For example, contemporaneously, the Yakama nation was practising forest management on their lands to produce marketable timber and preserve spotted owl habitat. Guided by an Indigenous worldview that considers 'land, plants and animals are interdependent' [48] (p. 17), the Yakama employed academic and Indigenous knowledge to create site-specific resource assessments and conservation strategies with diversified land use (*ibid*). This approach accommodated conservation- and business-oriented specific values by interpreting them through the deeper levels of the Yakama worldview. In summary, for contentious situations, navigating the typology's vertical interactions clarifies the deeper values involved in a dispute (to identify and discard proposed solutions that are not aligned) and provides new framing opportunities to reconcile seemingly incompatible values (to overcome problems portrayed in intractable ways) (Table 1).

Conclusions

Most environmental policy contexts largely rely on instrumental, anthropocentric conceptions of people–nature relationships [49]. Here, we have presented an inclusive typology that opens possibilities for engaging diverse meanings of value, including worldviews and knowledge systems. The typology invites environmental scholars and decision-makers to explore nature's multiple values and their interrelationships more thoroughly. Below, we provide guidance on how this typology of values can further inform transformative change for just and sustainable futures, based on four value-centred leverage points [50].

a) *To recognise the values of nature, the typology clarifies concepts and aids comprehension across understandings of values to help conduct plural valuations of nature.* Most ecosystem service research has focussed on assessing the distribution and/or extent of instrumental values measured in biophysical and monetary terms [51], and the *living from* nature (nature's capacity to provide resources for sustaining livelihoods, needs and wants) has been the dominant people–nature relationship framing of valuation studies [2]. Nature's intrinsic values have also been considered, but to a lesser extent [4,27]. However, work with Indigenous peoples and local communities, often with pluricentric worldviews and diverse knowledge systems, has revealed new options for sustainability transformation [52]. The typology provides a tool to identify how multiple value layers and types shape decisions within social–ecological contexts, expanding on existing plural valuation of nature for justice and sustainability [53].

b) *To embed values in decision-making, the typology helps recognise not only what, but whose values are at stake in decisions.* Sustainability transformation studies document a critical need to shift from individualism, materialism and economic profit to other principles such as care, unity, equity, reciprocity and justice [4,16,54]. Such a value shift implies systematic incorporation not only of 'what' values, but 'whose' are considered in decision-making. Traditional environmental decision-making ignores this contestation by purporting to separate 'facts' from 'values' [55], biasing approaches to quantitative costs and benefits (e.g. hectares, dollars). Aligning with recent agreements [56], this typology supports embedding multiple values via participatory decision-making process to address complex issues such as when trade-offs between different types of values cannot be easily resolved due to issues of incommensurability [57]. It provides a road map for better diagnosis of under- and over-represented worldviews, knowledge systems and conceptions of people–nature relationships, and how they can be associated with one-another in decision contexts. Given formal adoption by IPBES, it can gain legitimacy as a tool for those marginalised groups seeking to embed their values into political processes and overcome historical power relationships that privileged only some values.

c) *To institutionalize reforms that account for a greater diversity of values within and across layers, the typology of values helps align policy goals (i.e. broad values) and targets (i.e. value indicators).* For example, in New Zealand, governmental reforms to goals and target-setting contributed to more inclusive well-being policy-making. New Zealand's Living Standards Framework, designed to guide its Treasury Department's decision-making regarding resource allocation, includes health and well-being indicators that better reflect children's well-being and is more compatible with Māori knowledge systems [58]. This institutional reform has enabled expression of instrumental, intrinsic and relational values in other policy and legal domains, including the 2022 *Pae Ora* (Healthy Futures) Act with a focus on health equity (e.g. across Māori, disability, rural and women's communities) and building enduring relationships across health sectors [59]. Like in the New Zealand case, other governments could draw upon the typology of values as a means of thinking about how to consider a broader set of values in their well-being assessments.

d) *To shift societal norms and goals, the typology facilitates alternative transformation discourses and pathways.* Worldviews and broad values reflect general goals people strive for, they mainly affect behaviour indirectly via norms. Situational factors that encourage respecting common norms can activate sustainability-aligned values and promote pro-environmental behaviour (e.g. people are less likely to litter in a litter-free environment) [60]. The typology of values helps policymakers widen the framing of social influence strategies, for example, by highlighting possibilities for appealing to social norms in information campaigns concerning fairness, the protection of future generations and the environment. Yet, the rapid and radical transformations needed to address the biodiversity crisis imply a much larger and faster change in societal norms, including a change to the parameters of how we understand limits and the capitalist imperative of growth [61]. The typology enables recognition and consideration of alternative philosophies of good living, including those that challenge dominant perspectives such as the unlimited economic growth agenda (e.g. those aligned with post-growth economics [62], the Andean–Amazonian political project of *Buen Vivir* and life philosophy of *Sumak Kawsay*, the Bantu philosophy of *Ubuntu* and the Japanese tradition of *Satoyama*, among others). These perspectives, present among many Indigenous peoples, local communities and other knowledge traditions, may otherwise be neglected or silenced when only a narrow set of values or a single worldview is considered in decision- and policy-making [4]. For instance, *Buen Vivir* promotes shifts to 'slow tourism', requiring development strategies to be local-scale and benefits host communities [61].

Whilst this typology of values offers an overview of different meanings of value, fully operationalising it in decisions requires other considerations. First, it is important to understand the debate on individual versus shared values and the dynamics through which values are formed and change [3]. Also, confronting power structures and inequities when engaging diverse stakeholders is critical [63]. Despite the importance of nature's values in decision-making, other drivers also promote (or constrain) people–nature interactions [2]. Therefore, even when diverse values are represented in environmental scholarship or policies, acting in ways that align with them may be hindered politically, legally or practically. For example, some Indigenous peoples cannot interact with their traditional lands in accordance with their values of care and reciprocity because they have been displaced, and similarly many local communities may choose different ways to farm or harvest trees, if they were able to have more secure livelihoods less dependent on short-term income in volatile markets, or addressing climate change vulnerabilities.

Future academic studies and practical experiences could build on this recognition of the diverse values of nature and their importance for concrete decision-making

contexts by explicitly addressing how different types of institutional situations and power relations in both scholarship and policy-making affect what value concepts are studied, considered, expressed, aggregated, obscured or substituted. Approaches that embed the tyoplogy of values within existing conflict negotiation processes could also empirically examine how these interactions influence management and resolution, but also the potential to form shared social values among individuals and groups via deliberative processes. We expect that through such applications, power relationships and institutional biases towards different worldviews and values will become more transparent. In closing, there is an established need (e.g. GBF) to provide tools to advance the inclusion of nature's multiple values in decision-making, and this typology of values provides conceptual clarity as a practical way to advance that agenda.

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CRediT authorship contribution statement

CR led the writing (original draft) of the paper; CBA, SA and AV coordinated the work of the whole team (2018–2022), with the support of MC and UP. CR, CBA, AH, BM, RG, JK and RM coordinated the case examples; and all authors coordinated the analysis of the evidence and wrote (reviewed and edited) the various versions of the paper. CBA, SA, AV, AA, PA, MC, RG, AH, JK, DL, BM, RM, SO, SS, AS and EZ collected and analysed the assessed data.

Data Availability

All data sources relevant to this perspective can be found at: https://doi.org/10.5281/zenodo.6493134.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References and recommended reading

Papers of particular interest, published within the period of review, have been highlighted as:

- • of special interest
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2. •• IPBES: **Summary for Policymakers of the Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services**. Pascual U, Balvanera P, Christie M, Baptiste B, González-Jiménez D, Anderson CB, Athayde S, Barton DN, Chaplin-Kramer R, Jacobs S, Kelemen E, Kumar R, Lazos E, Martin A, Mwampamba TH, Nakangu B, O'Farrell P, Raymond CM, Subramanian SM, Termansen M, Van Noordwijk M, Vatn A. IPBES Secretariat; 2022, https://doi.org/10.5281/zenodo.6522392.
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important role that value articulating insitutions have in transformations toward sustainability.
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