Perspective

Fostering Transformation: Shifting Nature-based Solutions away from a human-nature dichotomy

E. A. Welden[1*], Alexandre Chausson[2*], Marina Melanidis[3]

1. School of Geography and the Environment, University of Oxford, South Parks Road, OX1 3QY, UK
2. Nature-based Solutions Initiative, Department of Zoology, University of Oxford, Oxford OX1 3PS, UK
3. Department of Forest Resources Management, University of British Columbia, Vancouver BC, V6T 1Z4, Canada

*Joint first authors

§ CORRESPONDING AUTHOR: Alexandre Chausson

Email: alexandre.chausson@zoo.ox.ac.uk

Address: Department of Zoology, University of Oxford, OX1 3PS, UK

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Abstract

1. Nature-based Solutions (NbS) have rapidly been gaining traction across the research, policy, and practice spheres, touted as transformative actions to jointly address biodiversity loss and climate change. However, there are multiple, alternative ways to imagine NbS in those three spheres.

2. To inform the NbS discourses across these three spheres, we critically reflect on the prevailing framing of NbS and consider the potential of a different framing of NbS to support transformations towards regenerative relationships between humans and nature. Such reflection is urgently needed to ensure that research, policy, and practice delivers on the transformative ambitions of NbS.

3. We propose a novel "core framing" of NbS, charting two pathways for how such a framing can support a human value-based transformation – first through influencing individual beliefs and values, and second through the communication and application of the NbS concept in research, policy, and practice. We argue that for NbS to support transformation, it must support a reframing of human-nature relationships, one where the interdependencies between people and nature are recognized as essential for social and environmental well-being.

4. We elaborate on how such a framing is key to support inclusivity and collaboration between diverse research perspectives, policy objectives across scales, and implementation practices, to deliver successful NbS.

Keywords: Nature-based Solutions; transformation; framing; human-nature dichotomy; human-nature relations

Introduction

In 2020 alone, there has been a flood of international support for Nature-based Solutions (NbS) from the UN's Decade of Ecosystem Restoration to the World Economic Forum to the UK's Green Recovery from COVID (DEFRA, 2020a; UN, 2019; WEF, 2020). As a result, there is growing momentum for NbS in influential climate and biodiversity policy spaces. For example, NbS are one of the five action tracks for the UNFCCC COP26 in the UK (DEFRA, 2020b) and one of the key themes at the next Climate Adaptation Summit in the Netherlands (GCA, 2020). NbS are defined by the IUCN as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (Cohen-Shacham, Walters, Janzen, & Maginnis, 2016). They encompass a broad range of actions, such as

forest landscape restoration, mangrove restoration, watershed management, agroforestry, and agricultural soil sequestration (Seddon et al., 2020). Recently clarified by the IUCN NbS Global Standard, the definition is now accompanied by a set of guiding principles in the wake of its rapid uptake across policy and practice (IUCN, 2020). This growing momentum behind NbS has been driven in part by the recognition that current actions to address environmental degradation are wholly insufficient to match the scope and scale of the challenge (Leclère et al., 2020; Seddon et al., 2020; Williams et al., 2020). Thus, the concept of transformation is often mentioned alongside NbS as a shift across scales of social organization; transformative change is deemed necessary to shift from an unsustainable status quo to jointly address the climate and biodiversity crises (Ehrenfeld, 2004; IPBES, 2019; Steffen et al., 2018). COVID-19 has catalysed this awareness, with growing calls from social movements, such as Extinction Rebellion and Fridays for Future, to ensure that measures to rebuild economies embody the vital importance of our relationship with nature, reflecting a shift in attitudes to address these challenges holistically (Otto et al., 2020).

NbS are themselves increasingly proposed as mechanisms to achieve transformative change towards more resilient, sustainable landscapes for people and nature (Woroniecki, 2020). However, for this to be realized, NbS must be framed as transformational. The framing of an issue is a key point of focus in transformation, as it influences how people understand the topic itself (Nisbet, 2009; Spence & Pidgeon, 2010). Thus, the way NbS is framed, which aspects of NbS are made salient in policies or documents (de Jesús Arce-Mojica et al., 2019; Entman, 1993; Hanson et al., 2020), has critical implications for how research, policy, and practice around NbS are interpreted. Such reflection also has important implications for understanding how these framings influence research and knowledge production, which in turn is essential to produce research supporting transformative change (West, Haider, Stålhammar, & Woroniecki, 2020; Woroniecki et al. 2020).

By transformation we mean, “a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values” (IPBES, 2019). Global societal challenges of climate crisis, biodiversity loss, and food and water security are rooted in, and exacerbated by, socio-economic structures which dichotomize humans from nature, making our existing system “untenable,” necessitating transformation (Abson et al., 2017; N. Castree, 2005; Folke et al., 2011; Plumwood, 1993). Achieving transformative change requires deep cultural and systemic shifts and resetting the dichotomous relationship with nature perpetuated by Western epistemologies (N. Castree, 2005; Nisbet, 2009; Schultz, 2002; Walsh, Böhme, & Wamsler, 2020). Challenging paradigms promoting

values and beliefs which dichotomize humans and nature taps into a deep leverage point for transformational change (Ives et al., 2018). Simultaneously, it requires critically reflecting on how we understand and frame these challenges, including the biodiversity and climate crises, as frames shape the strategies devised to address them (Wyborn et al., 2020). Although transformation requires change across scales, bottom-up to top-down, and across landscapes, the foundations of it lie in "changing relationships, cultural values and beliefs," i.e. "scaling-deep" (Moore, Riddell, & Vocisano, 2015; Moore et al., 2014). Changing norms, values, and world views in turn shapes transformational changes in rules and governance (Lavorel et al., 2019; Otto et al., 2020).

Here, we critically reflect on how the NbS concept is being framed on the international stage, and the implications this holds for its potential to support transformative change, specifically around shifting human-environment relations. As we expand on below, the concept is predominantly being framed through an ecosystem services (ES) lens, one which reinforces a human-nature dichotomy. Although ES research plays a crucial role in NbS science, we argue that if the concept is framed around ES as it presently is (Hanson et al., 2020), its potential to support a shift away from the human-nature dichotomy will inherently be limited. In turn, this will inhibit the paradigm shifts in our conceptualization of human-nature relations needed for transformative change. As crises and disruptions, such as COVID-19, create opportunities for transformative change (Abson et al., 2017), it is precisely at this juncture that a critical reflection on NbS framing in policy is needed.

Situating ourselves as researchers in the social and natural sciences focusing on NbS at large, Western universities, we propose an inclusive "core framing" of NbS as a foundation for a different perspective on NbS centred around the dynamic relationships between people and nature. This aligns with changing views in nature conservation towards nature and people, rather than nature for people, or nature for itself (Mace, 2014). We believe this is key to support transformative change by influencing individuals' perspectives and attitudes and shaping the impacts of communication in the public sphere. We then explain how this core frame opens novel, inclusive research and policy pathways and discuss implications for research, policy, and practice.

Current framing of NbS: Dominated by ecosystem services

The widely accepted IUCN definition of NbS is unique in its conceptual inclusion of people and nature to address societal challenges (Cohen-Shacham et al., 2016). This represents a major change in environmental policy to support sustainable development, driven by a growing evidence base within

Western science highlighting biodiversity as an essential underpinning of ecosystem services and human wellbeing (Folke, Biggs, Norström, Reyers, & Rockström, 2016; Naeem, Chazdon, Duffy, Prager, & Worm, 2016; Seddon et al., 2016). Thus, the definition moves away from a human-nature dichotomy, a division rooted in Western world views and increasingly recognized as a barrier to sustainability (Noel Castree, 2003). Although the understanding that nature and human wellbeing are interconnected and co-constitutive has long been recognized by many non-Western communities (Kimmerer, 2013; Ruiz-Mallén & Corbera, 2013; Salmón, 2000), what is compelling about the NbS concept is its capacity to introduce this relationship to an international stage closely associated with Western scientific worldviews.

Against this backdrop, NbS is emerging in research, policy, and practice heavily influenced by the concept of ES to understand human-nature relationships (Hanson et al., 2020). The ES concept has spurred an explosion of research and policy interest on the benefits humans derive from nature and improved scientific understanding of the relationships between ecosystem processes, functions, and benefits to people (Costanza et al., 2017; Ricketts et al., 2008). The ES frame can be applied to provide a structured approach to evaluating the impact of land-use decisions, including NbS, to certain aspects of human wellbeing (Haines-Young, Potschin, & Kienast, 2012; Maes et al., 2012). In turn, this supports land-use decision making and investment, helps track policy effectiveness, and can be used to account for the economic value of ecosystems across governance scales (Maes et al., 2012). As such, there is a close link between the NbS and ES concepts, "indicating a path dependency in its [NbS] uptake and use" (Hanson et al., 2020). For example, the IUCN's NbS Global Standard heralds NbS as a mechanism to "harness the services of ecosystems" and "deploy nature in helping resolve major societal challenges", and NbS as derived from "goods and services" (IUCN, 2020). Here, the overarching emphasis is on the utilitarian aspects of natural capital and ecosystem services (Potschin et al. 2016). The permeation of the NbS concept by an ES lens is rooted in prevailing power structures which depend upon, and reinforce, utilitarian values in policy and decision-making (Bekessy, Runge, Kusmanoff, Keith, & Wintle, 2018; Lele, Springate-Baginski, Lakerveld, Deb, & Dash, 2013). Therefore, although the concept and the standards make explicit the interdependency of human and environmental health, the way NbS is currently framed in policy and practice remains narrowly focused on understanding this relationship through the lens of ES: a lens which highlights one, external "nature" working for the benefit of "society" (Mace, 2014; Woroniecki, 2020).

We argue there is a need to ensure the NbS concept and associated narratives do not reinforce a dichotomy between humans and nature, superseding those power dynamics which led to NbS' initial

conception. Such a dichotomy becomes itself a barrier to transformation in that it remains entrenched in Western hegemonic worldviews. This worldview reinforces the focus on technocratic approaches which dominate scientific and decision-making arenas, stifling creative and innovative solutions to wicked problems (Nightingale et al., 2020; Pereira, Sitas, Ravera, Jimenez-Aceituno, & Merrie, 2019). Here, our aim is not to propose another critique of the ES approach; the risks and benefits associated with the ES concept have already been well articulated (e.g. see Bekessy et al., 2018; Lele et al., 2013; Redford & Adams, 2009). On the contrary, we aim to contribute to a constructive and collaborative dialogue, highlighting the inherent limitations of such a framing to make the case for a *core framing* of NbS—one more inclusive of other ways of understanding human-nature relationships, thereby fostering creativity and innovation in transformations for sustainability.

The Core Frame of NbS

As NbS in its definition focuses on both human wellbeing and biodiversity benefits, it has the potential to support a reframing of human-nature relations, in Western science, towards intertwined parts of a whole. Recently, scholars have called for a relational turn in sustainability science, shifting structures of thinking towards processes and relations amongst things and beings (Chan, Gould, & Pascual, 2018; Jax et al., 2018; Walsh et al., 2020). To promote such a turn, we propose this core frame for NbS: a frame which is inclusive, collaborative, interconnected, and diverse, gathering the multitude of perspectives on NbS at its centre. We term this "the core frame," as it provides a foundation for plural understandings of NbS, extending far beyond the limited examples provided in Figure 1. The core frame emphasizes the relational character of NbS, connecting rather than dichotomizing humans and nature. Within this foundation, the various elements of NbS research, policy, and practice nested in the broader socio-technical system are given space to collaborate with each other to support transformative changes in wider practices.

To understand a core framing of NbS which brings together NbS' various elements, we turn to theories of hybridity and assemblage, which are theoretical attempts to deconstruct dualisms and conceptualize humans' places within ecosystems. Hybridity promotes a shift from dualistic thinking, humans as separate and superior to nature, to hybrid thinking, humans and nature as mutually co-existent (Whatmore, 2002). In short, humans are not apart from nature, but a part of it, in hybrid relation. While recognizing there are differences between humans and nature, hybridity "decoupl[es] the subject/object binary such that the material and the social intertwine in a variety of ways" (Whatmore, 2002). The core frame supports hybrid thinking by recognizing that human wellbeing (the

social) and biodiversity (the material) are intertwined, co-constitutive, and collaborative. Framed this way, NbS creates space for a transformation of Western worldviews to one in which humans and nonhuman nature are interconnected and mutually dependent.

Taking hybridity one step further, in the core framing of NbS, humans are decentred, culturally diverse elements among a broader constituency of other living and non-living elements. This is the concept of an assemblage, a gathering of interconnected relations (Deleuze & Guattari, 1988; Latour, 2013; A. L. Tsing, 2015), of semi-independent parts of a whole (DeLanda, 2006). The core frame encompasses NbS' assembled parts, focusing attention on the ecosystem as a whole, with humans as a decentred element. In an era of the climate crisis, this core framing allows Western worldviews to recognize the co-dependencies between humans and other living, and non-living elements of the system. In turn, this makes salient the importance of functioning ecosystems for humans and other beings, ensuring the mutual survival of humans and other assemblage elements (A. Tsing, 2017).

If NbS is communicated via this interrelated, inclusive, and collaborative core frame, we see the potential for NbS to transform Western worldviews around human-nature relations in two ways. First, on the individual scale, how environmental concepts are framed can influence people's perspectives and attitudes (Bain, Hornsey, Bongiorno, & Jeffries, 2012; Corner, Markowitz, & Pidgeon, 2014; Spence & Pidgeon, 2010). Thus, with the core frame consolidating transformational elements of NbS (i.e. the interconnections between humans and nature), individuals may be influenced to shift towards this way of thinking and operating in the world. Second, the way environmental messages are communicated has material effects on environmental outcomes via influence of the public, or policy, sphere (Pezzullo & Cox, 2017; West, Haider, Stålhammar, & Woroniecki, 2020), which in turn influences individuals' opinions and values. Thus, the core frame has the potential to transform the large-scale spheres of research, policy, and practice. Conversely, if an ES frame continued to permeate those spheres as it does now, discourses and narratives would inadvertently lead to narrow problem framings which in turn constrain the panoply of solutions envisaged, thereby hindering the potential of NbS in practice (Bellamy & Osaka, 2020). Thus, the core framing of NbS in international and national policy discourses holds strong implications for achieving transformational impact at scale, commensurate with the scale of our global challenges.

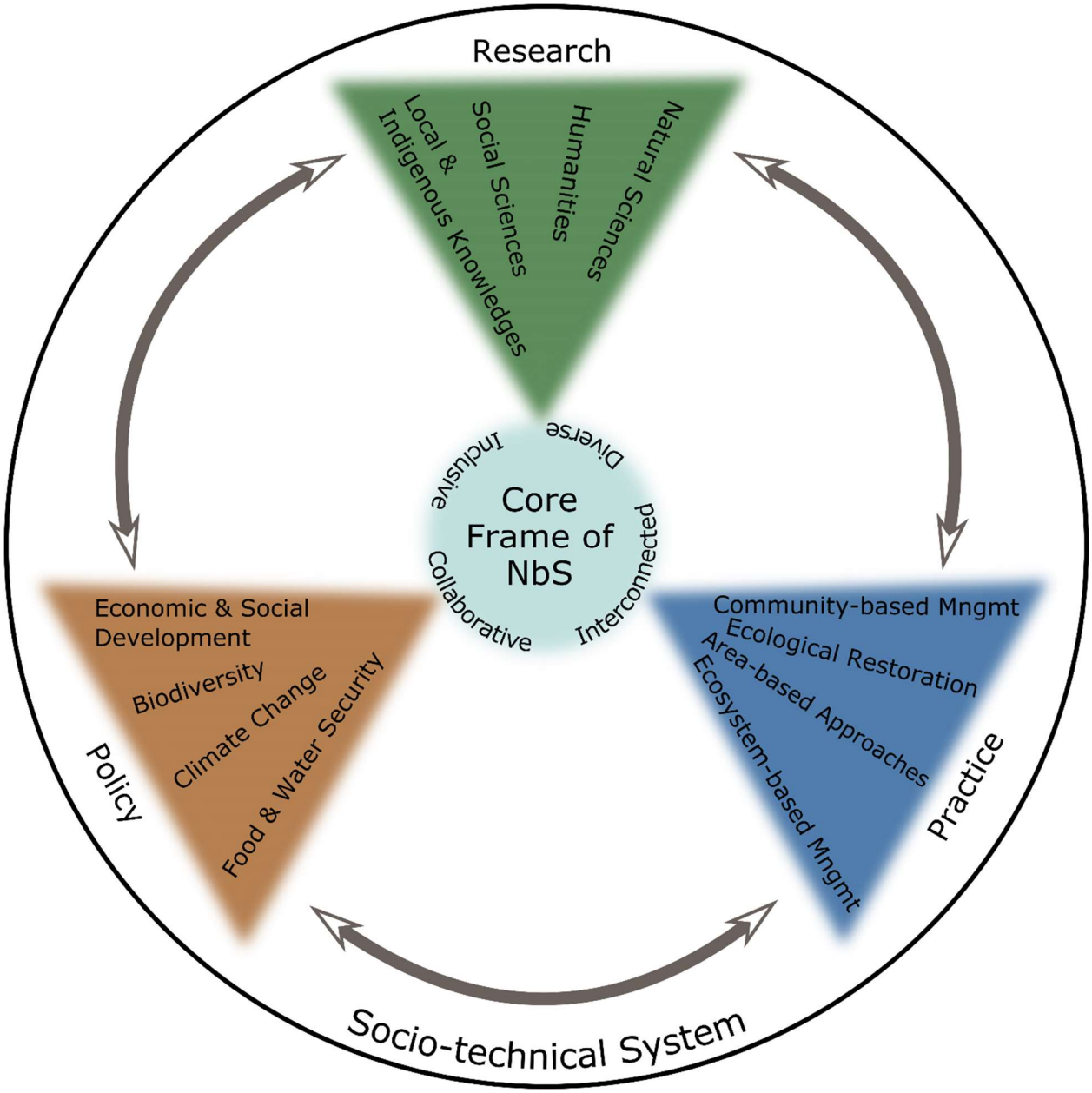

Figure 1: A visualization of the core frame of NbS, illustrating how the core frame brings together various research, policy, and practice elements. The core frame is inclusive, realizing interconnections and instigating collaborations between previously silo-ed areas and applications of NbS. This figure demonstrates how NbS should not be framed as only one practice or policy, nor coming from only one epistemological position; rather, to be transformational, it should be framed in a way that recognizes interconnectedness. Further, the examples given for research, policy, and practice are used for illustration. The core frame can welcome many others, hence why triangles are blurred. These are all situated within the given socio-technical context in which any NbS research, policy, or practice takes place.

Implications for research, policy, and practice

For the NbS concept to transform human-nature relations, we believe a holistic, interconnected, and inclusive core framing is urgently needed shape global discourses on NbS across research, policy, and practice (Fig 1). In this section, we review the implications the core frame could have across these three spheres.

The core frame would support narratives recognizing the interconnectedness of humans and nature (Fig 1), promoting an ethic of care to encourage environmental stewardship (Jax et al., 2018; West, Haider, Stålhammar, & Woroniecki, 2020). In contrast, framing nature as solely a provider of commodities and services can obstruct a vision for a more harmonious relationship, crowding out values driving stewardship thus hindering pro-environment behaviour change (Bekessy et al., 2018). Importantly, a technocratic framing of NbS as mere "solutions" or fixes to the environmental degradation driven by growth-based economies hinders transformative change, as it displaces the reality that these problems are fundamentally human, driven by norms and institutions which do not appreciate the multiple values of nature. Such framings promote incremental attempts to adapt to untenable development pathways driven by power structures inherently resistant to change, rather than transitioning away from them (Folke et al., 2011; Moore et al., 2014; West, Haider, Stålhammar, & Woroniecki, 2020). Although such a shift towards focusing on nature and people dynamisms is taking place in conservation science (Mace, 2014), the overall policy narrative is still dominated by a "nature for humans" perspective. In contrast to nature working *for* people, the core framing postures that NbS should be understood as people and nature working together, collaboratively. This aligns with the notion of people working *with* nature (Seddon et al., 2020). In turn, this can foster notions of caring, which have been identified as central forces for landscape stewardship (Jax et al., 2018). Ensuring that NbS discourses convey these messages is crucial for the reframing of human-nature relationships within Western worldviews.

Second, adopting the core frame would support the need for cross-sectoral collaborations and integrated policy making to address the biodiversity crisis, climate crisis, and development (Fig 1). Recognizing the dynamic, systemic linkages between people and nature across landscapes is crucial to support transformative change. This is increasingly understood and advocated for, yet in practice, decision-making often remains disjointed across sectors (Seddon et al., 2020). Importantly, current decision-making contexts narrowly focus on short term economic gains, crowding out the multiple values of nature underpinning wellbeing (Pascual et al., 2017). In such contexts, shifting values is key to

fostering transformative visions, which in turn can lead to a cascade of changes reconfiguring sectors and decision-making domains (Tàbara et al., 2018; Wiek & Iwaniec, 2014). Therefore, there is a clear need for more integrated socio-cultural valuation approaches, beyond economic valuation, to achieve sustainability and social justice alongside economic efficiency (Costanza et al., 2017; Pascual et al., 2017). Harnessing a frame of NbS welcoming a plurality of values in decision-making contexts thus holds important implications for achieving desirable outcomes.

Third, adopting the core frame would create space for more integrated, interdisciplinary research on NbS, nested in a more holistic understanding of human-nature interactions (see Box 1, Fig 1). Identifying social-ecological interactions across scales is crucial to elucidate how natural resource management can support harmonious landscapes for people and nature. Fundamentally, what we construe as benefits, or services, are generated by complex, non-linear and dynamic social-ecological interactions (Costanza et al., 2017; Folke et al., 2011), co-produced, or co-constituted, by people and nature (E. M. Bennett et al., 2015; Díaz et al., 2015; Lavorel et al., 2019; Palomo, Felipe-Lucia, Bennett, Martín-López, & Pascual, 2016). Therefore, although we recognize the dependence of societies on the biosphere, what drives the effectiveness of a solution is fundamentally an outcome of social-ecological interactions, rather than from natural capital. Yet in practice, the ES concept is applied through a reductionist lens, characterizing the relationship between people and nature as simple and linear (Costanza et al., 2017). As most research on NbS is conducted through such a lens (Hanson et al., 2020), knowledge remains limited in 1) understanding how to shape NbS to the social and ecological context and 2) capturing the complex nature of social-ecological drivers and outcomes (see Box 1). More emphasis is need in research on the interplay of the biophysical, ecological, and social dimensions to improve our understanding of how benefits are co-produced with nature (E. M. Bennett et al., 2015). The core frame addresses those limitations by centring human wellbeing and biodiversity as both outcomes and drivers of NbS for resilient landscapes. Conversely, framing NbS solely through the lens of ES emphasizes the biophysical or natural elements, as opposed to the social, even though the “solution” represents an intervention defined by people and activated by people with nature. Therefore, adopting a holistic, core framing of NbS is crucial to understand how to design NbS and what underpins their effectiveness. Importantly, this framing should support more inclusive research frameworks, welcoming interdisciplinary approaches, while accommodating previous bodies of research to inform the science on NbS. This way, research on NbS may take different pathways which retain the potential to merge and reinforce each other.

Fourth, a more inclusive core framing can foster collaborative spaces harnessing the diversity in knowledges, worldviews, and values necessary to foster creativity and innovation (Tang, 2019). Many local and Indigenous ways of knowing already reflect a holistic understanding of human-nature relationships (Kimmerer, 2013; Todd, 2016). Transdisciplinary processes enabling science to merge with other knowledge systems, including local and Indigenous knowledges, are therefore crucial to design and implement NbS that effectively address the complex, cross-cutting nature of global environmental challenges (Brink et al., 2018; Colloff et al., 2017). In fact, the incorporation of a diversity of knowledge-systems is recognized as a key definitional criterion of NbS (IUCN, 2020), and the Convention on Biological Diversity makes explicit the need for "full and effective participation and engagement of indigenous peoples and local communities" in the implementation of the Convention at national levels (CBD, 2019). This is important because the way the NbS concept is framed in practice shapes whose knowledge matters, which in turn can constrain positive social outcomes like empowerment (Woroniecki et al., 2020). However, fostering inclusion requires addressing elements of power and politics that hinder equitable participation in knowledge co-production and decision-making. Without attending to power, the ability for diverse actors to participate fully in knowledge co-production and decision-making can be restricted (Miller & Wyborn, 2020), resulting in the reproduction of unequal power relationships (Turnhout, Metze, Wyborn, Klenk, & Louder, 2020). Therefore, while the extent to which a core frame can foster equality and plurality is dependent on whether and how politics and power are acknowledged and addressed (Vincent, Carter, Steynor, Visman, & Wågsæther, 2020), we see a core frame incorporating diverse knowledges and practices as a critical step in the process. NbS has the potential to foster co-production and align policy and practice with a long-held understanding of human and nonhuman relationships, but only if its framing fosters such collaborative spaces.

Conclusion

We urgently need a reframing of human-nature relationships, one where nature and people are not merely viewed as separate entities, but as intertwined to promote social and environmental wellbeing. If the NbS concept does not transcend the Western tendency to dichotomize humans and nature, its potential to foster transformative change to support human and environmental wellbeing will inherently be limited. The core frame presented here holds the potential to aid in this transformation, leveraging communication to shift the focus of NbS from solely ES to an inclusive, collaborative assemblage with human-nature connections at its centre. Framed in this way, NbS helps resituate people as integral constituents of ecosystems, supporting transformative change across scales. NbS can

serve as a conceptual lens to promote transformation towards a more just and sustainable society, where humans and nature thrive as we find pathways to address the intertwined global challenges of health, biodiversity, and the climate crisis.

Box 1. Applying the core frame in research on Nature-based Solutions

As an example of how the core framing can shape a field, we think through its application in the research sphere, recognizing interconnected research topics and the need for interdisciplinary collaborations. First, when taken up in research, the core frame provides a focus on place and recognizes that NbS as *interventions* sit in social-ecological landscapes shaped by co-evolving, context-specific interactions between society and nature (Folke et al., 2004; Folke, Hahn, Olsson, & Norberg, 2005; Walker, Holling, Carpenter, & Kinzig, 2004). This understanding is crucial to delivering sustainable benefits and managing trade-offs, as it allows fine-tuning NbS to social-ecological contexts (Seddon et al., 2020). For example, how NbS interact with local power relations, market forces, social structures, gender relations, or the governance context mediates their outcome (Bhattarai, 2019; Oduor, 2020). Additionally, the right choice of species is heavily dependent on the biogeographical context and holds critical implications for promoting the resilience of NbS (Seddon et al., 2020).

The core frame brings focus to the social-ecological relations underpinning the emergence of benefits for people and nature. For example, people's interactions with nature influences their social capital, with beneficial impacts on livelihoods, and people's capacity to adapt to climate change (Valenzuela, Yeo-Chang, Park, & Chun, 2020; Woroniecki, 2019). This outcome emerges from human-nature relations and is not solely derived from nature per say. However, the emphasis in NbS research is predominantly on tangible benefits (e.g. protection against climate hazards) (Chausson et al., 2020). Yet, core motivations for engaging in NbS also include relational values, including intangible connections to nature which foster stewardship and care and drive positive human-nature interactions (Chan et al. 2018; EC, 2020). For example, Tidball, Metcalf, Bain, and Elmqvist (2018) show how through community-based reforestation, the act of coming together to plant trees strengthens social infrastructure and fosters sense of place, spurring virtuous cycles of civic engagement. Exploring these dynamics and emergent outcomes is essential to scale-up sustainable NbS.

However, most published research on nature-based interventions lacks an integrated focus considering broader social and ecological outcomes (Chausson et al., 2020; de Jesús Arce-Mojica, Nehren, Sudmeier-Rieux, Miranda, & Anhuf, 2019; Hanson, Wickenberg, & Olsson, 2020). Only focusing on biophysical, or economic outcomes of NbS ignores the plurality of benefits NbS can bring (Seddon et al., 2020). It also prioritizes the natural sciences and environmental economics at the expense of other disciplines essential to understand human-nature interactions such as human-environment geography, environmental anthropology, or the environmental humanities (N. J. Bennett et al., 2017). Therefore, crucially important knowledge is left out hampering the design, implementation, and governance of NbS.

Nesting NbS research in the core frame makes explicit the dynamic, co-evolving relationships of people and nature. This allows for a more comprehensive understanding of how NbS interfaces with the local context and what drives effectiveness. This can be achieved by incorporating relational approaches in research to generate more holistic analysis of human-nature connectedness (West, Haider, Stålhammar, & Woroniecki, 2020). The core framing would also support and encourage more collaborative, interdisciplinary research, including research on how NbS build social capital, and address issues of equity and justice, recognized as pillars of sustainable development (UN, 2016).

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