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People and Nature

GUEST EDITORIAL

Examining Human–Nature Relationships Through the Lens of Reciprocity: Insights from Indigenous and Local Knowledge

Human–nature relationships through the lens of reciprocity: Insights from Indigenous and local knowledge systems

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Abstract

1. In the context of climate change, biodiversity decline and social injustice, reciprocity emerges as a way of living and being in this world that holds transformative potential. Concepts of reciprocity vary and are enacted in specific cultural practices grounded in Indigenous and local knowledge systems.
2. This editorial synthesises first-hand evidence of how practising reciprocity can result in positive reciprocal contributions between people and nature. It also offers a theoretical justification of why considering reciprocity can lead to more equitable, inclusive and effective conservation and sustainability policy and practices, contributing to curving the colonial baggage of academic inquiry and development action.
3. Nurturing reciprocal relations between people, especially between academics and Indigenous Peoples and local communities, is a necessary first step to identifying pathways whereby living in harmony with nature can be achieved.

KEYWORDS
Indigenous and local knowledge, reciprocal relations, reciprocity, social-ecological systems

For affiliations refer to page 929.

1 | CONTEXT

Climate change, biodiversity decline and social injustice threaten planetary well-being (IPBES, 2019a; IPCC, 2022). The window of opportunity to take action to address these interwoven crises is narrowing (Díaz et al., 2019; IPBES, 2019b). Well-established evidence shows that slowing biodiversity loss and climate change urgently requires transformative change—meaning a fundamental system-wide reorganisation across technological, economic and social factors, including paradigms, goals and values (Díaz et al., 2020; Visseren-Hamakers et al., 2021). The importance of putting in place the seeds for this foundational, system-wide move away from 'business as usual' models towards transformative action has been firmly emphasised in global policy discussions. For example, the landmark Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment concluded that the current social-ecological crisis can only be addressed through deep structural interventions targeting key leverage points in the current decision-making systems (Chan et al., 2020; IPBES, 2019a). Similarly, the Convention on Biological Diversity has implemented a new work programme towards fulfilling its 2050 Vision of 'Living in Harmony with Nature' (Reyes-Garcia et al., 2021). This entails a pervasive shift across sectors in how human–nature relations and their multiple expressions in lands and seas are recognised and sustained in environmental science, policy, education and practice (Cariño & Farhan Ferrari, 2021; Fernández-Llamazares et al., 2021). This Special Feature, entitled 'Examining human-nature relationships through the lens of reciprocity: insights from Indigenous and Local Knowledge', explores the concept of reciprocity as a way of living and being in this world that holds transformative potential.

Even amid ongoing crises and challenges in our interactions with other living beings, reciprocity—and in particular positive reciprocal contributions between people and nature (Ojeda et al., 2022)—emerges as a property of social-ecological systems. The seminal work 'Braiding Sweetgrass' by Potawatomi scholar Robin Wall Kimmerer (2013) laid the foundation for the scholarly study of reciprocity with the natural world. Reciprocity arises from the complex experiences, interactions and actions resulting in relations of mutual caretaking between nature and society (Diver et al., 2019). Most definitions of reciprocity in articles in this compilation are normative, emphasising mutually beneficial outcomes (Table 1). Most of them provide first-hand evidence of how enacting reciprocity can result in positive social and ecological outcomes, and in many cases, these relationships have been ongoing for millennia. They showcase concepts of reciprocity as reflected in specific cultural practices grounded in Indigenous and local knowledge systems, provide evidence of how reciprocity works and offer a theoretical justification of why considering reciprocity is important for more equitable, inclusive and effective conservation and sustainability policy and practices. In this editorial, we summarise the key themes emerging from these articles, linking them to other bodies of literature and highlight their relevance for policy development.

2 | RECIPROCITY: CONCEPTS AND CULTURAL NORMS

Reciprocity can take many different shapes and forms (Vaccaro, 2024), and Table 1 illustrates the numerous definitions provided in the papers in this Special Feature. For many Indigenous Peoples and Local Communities (IP and LC), reciprocity often entails asking for permission, taking only what is needed, sharing what is taken and giving thanks or giving back, be it through ritual or material practices (Seaton, 2013; Varanasi, 2020). In many Indigenous worldviews, reciprocity helps ensure health and security through human efforts in alignment with spiritual forces, landscapes and the species therein. For example, reciprocity can be a legal responsibility, tenet or norm, and moral ethics. Identity, morals, values, spirituality, sense of fairness and legal responsibilities can all be interwoven into ecological relationality and reciprocity with the landscape, as is the case for Ts'msyen (Tsimshian) people of the northwest coast of North America (Greening, 2024). In Baka culture (Cameroon; Figure 1a), a sense of indebtedness is unnecessary because it is everyone's duty to share, and sharing is often perceived as an opportunity to demonstrate one's moral ethics, care and affection (Hoyte & Mangombe, 2024). Relationality, relational values and strong attachment underpin both Baka relations with nature and with each other. Reciprocity with the natural world is thus embedded in ideology and practice, as well as emotion (Zent & Zent, 2022). Despite the wide diversity of IP and LC around the world, reciprocity is central to many of their worldviews. It often emerges as a hallmark of many cultures (e.g. Kimmerer, 2013; Turner, 2005) where humans are usually perceived as inseparable from other beings and part of nature in a continuity that spans the past, present and future (Descola, 2005; Greening, 2024; Viveiros de Castro, 1992). In many cultures, reciprocity is understood as an interpersonal and communal responsibility to ensure the welfare of the community and the social-ecological system as a whole, where ancestors and those yet to be born are equally considered (Fernández-Llamazares & Virtanen, 2020). Because human and non-human relationships are respected and refined over deep time, societies create social, spiritual and political structures that reflect these relations (Fowler & Lepofsky, 2011; Nadasdy, 2007).

Reciprocity is opposite to perspectives emphasising unidirectional flows of contributions, services or benefits from nature to people. It thereby stands in stark contrast to the unilateral, exploitative and growth-oriented globalised capitalist societies (Armstrong & Brown, 2019). IP and LC often have practices ensuring fair resource distribution. In Baka and other hunter-gatherer cultures, sharing on demand—where people can request and receive both consumable and non-consumable items—prevents unfair resource accumulation (Hoyte & Mangombe, 2024). The narratives of IP and LC are also rich with stories about how excesses are punished with disasters affecting the community and the world beyond the individual. In Mongolia (Figure 1b), local people believe that when communities stray from reciprocal practices—like maintaining sustainable herd sizes—the natural

TABLE 1 Citations from articles in this Special Feature that provide explicit definitions of reciprocity.

Citation	Definition
Alvarez et al. (2025)	'Reciprocal contributions encompass actions, interactions, and experiences between people and other elements of nature (recognising that people are an integral part of nature). These interactions result in positive feedback loops that benefit both people and nature, directly or indirectly, at different dimensions and levels (Ojeda et al., 2022). Although reciprocity could have a functional purpose (Mattalia et al., 2024), it holds biocultural, ontological, and cosmogonic significance'
Armstrong et al. (2024)	'Reciprocity is variously defined as a social, psychological, or cultural norm that involves a mutual exchange of benefits and favours. It can also be more broadly regarded as responsibility to living beings, according to the customs, expectations, and ideologies of a social group'. 'Reciprocity is NOT to be understood as something functional, transactional, or even consequentialist, rather as a moral duty of reciprocity guided by relational and spiritual views of the land'
Correia et al. (2025)	'Reciprocity is a form of praxis—theory informed action—based on intergenerational knowledge transmission and adaptive management of vital resources in the face of radical territorial change…reciprocity cannot be understood only as a concept but that it is intimately tied to material practice and dynamic relations that bring the human and non-human worlds together'
Díaz and Pascual (2025)	'Reciprocity is used in the broadest sense, to refer to the mutual interactions, positive and/or negative, between living entities with the capacity to act autonomously on each other, of which conscious agency at both ends is but a special case'
Fisk et al. (2025)	'Reciprocity is a norm that is essential for collective action between actors. When reciprocating actors establish a positive and mutually benefiting relationship, this creates trust among actors and eventually high levels of cooperation'
Hoyte and Mangombe (2024)	'Reciprocity as a circular system made up of direct or indirect human-human and/or human- non-human actions, interactions, and experiences (Kimmerer, 2020; Ojeda et al., 2022)'
Kalle et al. (2024)	'Reciprocity is an 'obligate symbiosis', the relationship established by the continuous exchange, give and take, between society and the environment (Kimmerer, 2013; Miltenburg et al., 2022)'
Ojeda et al. (2024, 2025)	'Kimmerer (2013) characterises reciprocity as "a culture of gratitude, in where everyone knows that gifts will follow the circle of reciprocity and flow back to you again"'
Phatthanaphraiwan and Greene (2025)	'Reciprocity has different meanings in different disciplines, but we use it here in a relational sense to describe a two-directional exchange of giving and taking, an exchange characterized by mutual care'. 'Reciprocity […] serves as a connective fibre that flows between all beings, thus tying together the various actors, actions and states of being in the relational network'

environment suffers, leading to intensified *dzud*, severe winter events that often result in widespread livestock loss and harm to humans (Batdelger et al., 2025). In the Chiloé Archipelago, conflicts over algae or seafood are believed to provoke negative responses from supernatural entities leading to poverty across species, including humans (Alvarez et al., 2025). The cultivation and care for medicinal plants in the northern Ecuadorian Amazon not only foster social-ecological well-being (Figure 1c; Correia et al., 2025) but also can result in punishment if someone consumes certain plants without respecting necessary protocols. Because of their direct observations of the impacts of human activity in nature, IP and LC can also adapt their practices to ensure sustainable use of resources. In Salanguillo, western Ecuador, deforestation and forest degradation fuelled by international market pressure on forest resources had negative consequences on the ecological integrity of forest ecosystems. The physiognomic change of the forests caused water shortages in the lower parts of the commune, affecting crop irrigation and productivity, leading to the community's establishment of conservation agreements (Loayza et al., 2024). All these examples show how communities actively avoid greed and misuse of natural resources. Yet, reciprocity is not only a human value: It arises organically within the tapestry of people's direct relationships with nature.

3 | RECIPROCITY RESULTS IN CO-PRODUCTION OF SOCIAL-ECOLOGICAL SYSTEMS

The maintenance of reciprocal relations underpins the sustainable use of plants, fungi, animals, and other elements of nature, either consciously or unconsciously. Humans can play (and according to the worldviews of many IP and LC, *should* play) an active role in protecting or supporting other components of nature, for example, through practices to maintain and enhance certain species or through ensuring the health of territories. Reciprocity is often the backbone of contributions that many communities make to their environment, and through this they become active participants in co-producing landscapes and seascapes alongside a multitude of other beings (Comberti et al., 2015). A corollary to this is that the mutual well-being of the land and people is dependent on the ongoing expression of reciprocity between them (Kimmerer, 2017). The very

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FIGURE 1 (a) Ferdinand, a young Baka man, collects forest mushrooms to share (South region, Cameroon) © Simon Hoyte; (b) Women herders are milking yaks (Khangai soum, Arkhangai Province, Mongolia) © Zsolt Molnár; (c) A tree reflects on *yoco* in a serving bowl (Siekopai Remolino community, Rio Aguarico, Ecuador) © Joel E. Correia; (d) Paula Barros in a *corralito de pirén* (Apiao Island, Chile). *Corralitos de pirenes* involve modifying the intertidal area of smaller islands, adding small boulder mounds that harbour biodiversity and allow the reproduction of a small fish called *pille* (*Patagonotothen* spp.) by serving as a protected habitat for its eggs (*pirenes*) © Ricardo Alvarez Abel; (e) A *loko i'a* (fishpond) in Waimānalo, O'ahu © Jonathan Fisk; (f) Jhony Constante, a community ranger selectively harvesting *tagua* seeds (Salanguillo, Ecuador) © Gabriela Loayza; (g) A Maasai man collects elephant (*Loxodonda africana*) dung for medicinal use, illustrating the ethnobiological mutualism inherent in human–wildlife coexistence, even amid conflicts (Monduli District, Tanzania) © Elicia Bell; (h) Artisanal fisherman Luis Levil cleaning a southern hake (Strait of Magellan, Patagonia, Chile). After completing the fishing operations, fish offal is discarded and consumed by various seabird species © Katrina Pyne; (i) Cooperative fishing between artisanal fishers and wild Lahile's bottlenose dolphins is founded on the mutual understanding of behavioural cues and foraging synchrony that ensures fishing success for both parties (Laguna, southern Brazil; Cantor et al., 2023) © Fabio G. Daura-Jorge; (j) Spencer Greening on a successful mountain goat hunt in Gitga'at Territory © Adam Foss.

notion of reciprocity as we discuss it here is one in which biophysical processes and characteristics cannot be disassociated from human influence and vice versa (Rozzi, 2015). In other words, as people interact with their biophysical environments, those environments provide positive or negative feedbacks based upon the nature of the interactions. These relationships can serve as catalysts for care ethics, attachment emotions, spirituality and biocultural memory (Anderson, 2014). Reciprocal contributions can take various forms, such as increasing the numbers of certain species in specific places (e.g. abalone transplants in Haida Gwaii, Canada; Ojeda et al., 2025) and limiting the numbers of others (e.g. seagulls and cormorants in Kihnu Island, Estonia, Kalle et al., 2024), making physical changes to habitats (e.g. benthic arrangements and *corralitos de pirenes* in the Chiloé Archipelago, Chile; Alvarez et al., 2025; Figure 1d; low-intensity cultural burns by Tribes in California and Oregon; Fisk et al., 2025; preventing woodland encroachment and enhancing rangeland biodiversity through Maasai livestock grazing practices in Northern Tanzania; Mapinduzi et al., 2003), creating new habitats (e.g. abalone *condos* in Haida Gwaii, Ojeda et al., 2025; nesting boxes in Kihnu Island, Estonia, Kalle et al., 2024; *loko i'a*, fishponds, in Hawai'i; Fisk et al., 2025; Figure 1e) or maintaining ecological processes (e.g. leaving *tagua* palm seeds on the forest soil to allow regeneration of populations and provide food to dispersers; Loayza et al., 2024; Figure 1f). Moreover, protecting species in certain areas (e.g. sacred natural sites) allows protected and other species to disperse outward to areas where hunting or resource gathering is allowed (Phatthanaphraiwan & Greene, 2025). Expanding this further, human–wildlife coexistence (sustainable resource sharing through mutual risk adaptation; Carter & Linnell, 2016) is reinforced by beliefs in respect, reciprocity and kinship that foster tolerance, including towards species essential to ecosystem structure and function, even when they may pose serious risks to human livelihoods or safety (Figure 1g). Through reciprocal contributions, aspects of ecosystem structure and function are co-produced with humans. Tending the land and sea and fulfilling reciprocity duties is perceived as a necessity by many IP and LC, as a land uncared for, unused and unacknowledged will impoverish (Fache & Moizo, 2015; Zent et al., 2022).

While many of the articles in this Special Feature highlight Indigenous Peoples and their practices (e.g. Alvarez et al., 2025; Correia et al., 2025; Fisk et al., 2025), others show that non-Indigenous, local communities and other place-based knowledge holders also establish reciprocal relations with elements of nature. For example, in Chile's marine Patagonia, artisanal fishermen, both Indigenous and non-Indigenous, implement 'underwater arrangements' that allow the restoration of overexploited ecosystems (Alvarez et al., 2025). In France, commercial arnica harvesters, an aromatic plant used in various pharmaceutical and cosmetic products, implement several practices of care (Locqueville et al., 2025). French arnica harvesters trade off economic value (harvested volume) for social and cultural values such as having positive relationships with the environment (avoiding degradation and maintaining the landscape to preserve the harvested resource) and with other actors (assuring land access and co-creating the landscape; Locqueville et al., 2025). Similarly, artisanal hake fishers in Patagonia express that their work can generate reciprocal contributions with seabirds (Ojeda et al., 2024). Albatrosses and petrels offer companionship during long days at sea, and fishers, in turn, feed them hake offal, creating psychological as well as ecological benefits (Ojeda et al., 2024; Figure 1h). In southern Brazil, both long-term and more recent artisanal net-casting fishers have maintained a traditional cooperative fishing tactic with wild dolphins in which both species mutually benefit (Cantor et al., 2024; Figure 1i). Fishers and dolphins have greater access to material (fish) and non-material gains (social connections) when fishing together than when fishing independently (Cantor et al., 2023). This type of reciprocity goes beyond profit-driven interactions to embrace a holistic view of sustainability that strengthens bonds between people and the places they depend on.

4 | EPISTEMOLOGICAL AND ONTOLOGICAL PERSPECTIVES UNDERPINNING RECIPROCITY

Harnessing the transformative potential of reciprocity in sustainability policies (including climate adaptation and mitigation as well as biodiversity conservation) is contingent to acknowledging the central role of culture in human-nature relations. Nature is a socially and culturally constructed idea, and every conception of nature means different things to different groups of people at different historical moments (Arnold, 1996). Human groups, each with their own cultural background, have different approaches to the conceptualisation of nature, which in turn influences the way they deploy their agency in it (Vaccaro, 2024). Many IP and LC cosmologies and foundational ontologies across the world do not discriminate between humans and nature (Descola, 1986, 2005; Viveiros de Castro, 1992), in sharp contrast with the Western nature-culture dualism. This is the case for many of the study cases in the Special Feature (e.g. Armstrong et al., 2024; Greening, 2024; Hoyte & Mangombe, 2024; Phatthanaphraiwan & Greene, 2025). In these cosmologies, humans are conceived as a group of beings among many, inseparable from other groups of beings: 'humans do not occupy a privileged position in the universe as they do in Buddhist cosmology, nor do they hold dominion over other beings and natural resources as they are often considered to in Christian cosmology' (Phatthanaphraiwan & Greene, 2025).

More-than-human agency, personhood and sociality (for example, plants and animals giving themselves to be used by humans) are at the forefront of many IP and LC worldviews (Baker, 2020; Turner et al., 2022). The environment is often perceived as unconditionally giving, with natural resources being gifts offered to humans (e.g. Greening, 2024; Figure 1j). Further, the environment or its constituting elements can be perceived as relatives. This relationship between the human and the non-human has been conceptualised as 'kincentric ecology' (Bird-David, 1999; Salmón, 2000). From this perspective, plants, animals and fungi are not seen as food or material

sources, but rather as vital participants in a relational web that connects humans and animals to spirits, ancestors and other beings. For example, in Baka knowledge systems, individuals of each type of being ('species') only exist through their interactions with many other beings and their shared environment, which they all constantly change (Hoyte & Mangombe, 2024). This contrasts with positions dominant in Western science, in which human agency is an external 'driver or factor' of non-human ecology and evolution (e.g. Bliege Bird & Nimmo, 2018; Sullivan et al., 2017).

Knowledge and its production are inseparable from paradigms and moral codes (Greening, 2024). The ontological and epistemological foundations of many IP and LC worldviews, rich with reciprocity values, question the feasibility of reconciling them with Western environmental management practices and regulations, which are based on a Cartesian understanding of the world. For example, Kalle et al. (2024) show that pan-European nature regulations (including banning bird egg collection, visiting islets, etc.) had a drastic negative effect on the preservation of Kihnu culture, which is a UNESCO-listed Oral and Intangible Heritage of Humanity, as well as on seabird populations, with seagulls and cormorants becoming pests. Western environmental management leans heavily on materialistic principles, giving primacy to physical substances to the exclusion of emotional, spiritual and other immaterial realities (e.g. Armstrong et al., 2024). By contrast, 'Two-Eyed Seeing' (*Etuaptmumk*), conceived by Mi'kmaw Elder Albert Marshall, provides a pathway to plurality between Indigenous (or other place-based) knowledge and Western science. This approach differs from knowledge assimilation and enables co-production of knowledge and effective governance decisions (Reid et al., 2021). Reconciliation can be attempted by deploying transdisciplinary approaches and welcoming a diversity of voices within academia and natural resource management, building bridges between knowledge holders and systems to study and support reciprocity.

5 | METHODOLOGICAL DIVERSITY AND INNOVATION IN ADDRESSING RECIPROCITY

Embracing and studying reciprocity can be done through research processes that establish reciprocal collaborations with diverse partners and actors (Reo, 2019; Turner et al., 2022). Most of the articles in this Special Feature are either led by or co-authored by Indigenous or Local scholars or non-academic collaborators. For example, Kalle et al. (2024) is co-authored by a community member without prior academic background who participated in data collection and interpretation to fully integrate their emic perspective. Loayza et al. (2024) employed a transdisciplinary approach that involved academics, NGOs, the private sector, and Indigenous leaders, alongside a multidisciplinary and mixed-method strategy, to identify reciprocity across symbolic, biophysical and political dimensions. Additionally, Alvarez et al. (2025) apply relational ethnography, aligning with the concept of *diálogo de saberes* (lit. knowledge dialogues; Leff, 2004), which emphasises collaborative exchange and the co-production of knowledge across diverse systems. By creating spaces where knowledge holders contribute as both participants and co-authors, this research approach transcends traditional roles, fostering a more integrative and collaborative process.

Several of the articles also employ innovative methodological approaches in ways that could be interpreted as embodying the idea of reciprocity. For example, Correia et al. (2025) developed a dynamic knowledge co-creation process guided by Indigenous practitioners to write with an 'ecology of knowledges' (de Sousa Santos, 2007) that interweaves insights from practitioners and academic sources. Bell et al. (2025) use cultural exchanges between Maasai communities in Tanzania and First Nations in British Colombia and the Yukon, and participatory videography, to support co-learning. While most of the articles investigate the perspectives of people, Ojeda et al. (2024) apply two lenses to reflect the views of both hake fishers, and uniquely, the perspective from the species that are part of the hake-human interaction (in this case, seabirds, and especially albatrosses). This is approached by employing methods in behavioural ecology. Greening (2024) uses autoethnographic narrative and storytelling, focusing on his 'own journey of being groomed into becoming a mountain goat hunter within the hereditary governance system of his community, and how this process revealed a methodology to achieve relationality and reciprocity on the landscape while harvesting'.

6 | RECIPROCITY FOR FAIRER AND MORE EFFECTIVE POLICY

While the role of IP and LC is increasingly recognised in academic and international policy arenas, a lack of recognition by national governments and some academic fora persists (McElwee et al., 2020; Tormos-Aponte, 2021). Lack of awareness is fourfold: epistemological (different knowledge production and validation methods), ontological (different assumptions of reality), ethical (different moral responsibilities between human and non-human beings) and political (different positions of power to enforce perspectives in collaborative practices, Ludwig & El-Hani, 2020). IP and LC stewardship can be at least equally effective than state-governed protected areas in safeguarding biodiversity (Schuster et al., 2019; Simkins et al., 2024; Sze et al., 2022). However, nature protection discourses and policies are often inadequate for IPs and LC because they ignore the 'relationships and responsibilities to the natural world critical for well-being and collective continuance' (Dennis & Bell, 2020, p. 380). Co-creating knowledge across systems risks neglecting spiritual views of the land or the tenets of reciprocity, 'cherry-picking' aspects of Indigenous and Local knowledge that fit Western science paradigms (Armstrong et al., 2024; Tengö et al., 2017; Turner & Spalding, 2013). Since many aspects of Western and IP and LC knowledge systems are incommensurable, Western academy must unlearn colonial tropes to avoid assimilation, commodification, mistranslation and decontextualisation when learning from IP and LC worldviews (McAlvay et al., 2021; Tilley, 2017). This is paramount

as IP and LC are too often dispossessed by supposedly 'sustainable' policy and conservation, which creates further conflicts.

IP and LC suffer discrimination, land dispossession and a lack of understanding of their cultures by government officials that impede reciprocity values from being appropriately enacted in environmental stewardship (Armstrong et al., 2024; Fisk et al., 2025; Phatthanaphraiwan & Greene, 2025). This case is best illustrated by the Karen Indigenous communities in Thailand. Karen communities have inhabited their territories for over 200 years, long before such regions were declared conservation areas by the state. The government's designation of these areas as protected territories, often overlapping with traditional residential and agricultural lands, has resulted in restricted access to opportunities and rights for utilising Indigenous knowledge and wisdom in natural resource management (Ratchai & Thipmanee, 2024; Supang, 2024; Suporn, 2009). This has significantly diminished the community's capacity to sustain their cultural practices and their long-standing, balanced stewardship of natural resources.

Several papers in this Special Feature argue that transformative action must begin immediately, and can be enabled, strengthened and accelerated with the collaborative application of conservation and management models that practise justice and fully embrace ideals of reciprocity. Biocultural approaches to conservation are often implemented to guide transformative action to reclaim, reinvent, restore, reconcile and regenerate reciprocal connections with nature (Mattalia et al., 2024). These approaches offer substantial potential in embedding the concept of reciprocity in decision-making (Kalle et al., 2024). Díaz and Pascual (2025) highlight how reciprocity is embedded in the IPBES conceptual framework, providing an invaluable tool to draw more attention to the human shaping of (and practices of care towards) the rest of the living world. The transformative nature of these approaches is evident in their systems-wide perspective, explicitly highlighting the interconnections between nature and culture and the interwoven feedback loops between ecological dynamics and human quality of life (Reo, 2019; Sterling et al., 2017). Many Indigenous communities around the world are also advancing and sharing different stewardship approaches for nurturing positive, reciprocal and responsible relationships between humans and their non-human kin (FPP et al., 2020; ICCA Consortium, 2021; Swiderska et al., 2020). In fact, protocols of responsibility, reciprocity and respect towards non-humans are often enshrined in Indigenous law (e.g. Artelle et al., 2018; Atleo, 2011). For example, in the Ecuadorian Amazon, Cofán, Siona and Siekopai communities are working to revitalise the cultural use of the vine *yoco*, which simultaneously strengthens inter-generational knowledge transmission and cultural heritage while playing an increasingly important role in contemporary territorial defence and community-led biocultural conservation (Correia et al., 2025). To accomplish the Convention on Biological Diversity's 2050 vision of 'Living in Harmony with Nature', global biodiversity institutions, supported by member states, should not only acknowledge the central role that reciprocity can play in supporting the transformative change so widely called upon, but also integrate it in their actions (Díaz & Pascual, 2025).

7 | WAYS FORWARD: NURTURING HEALTHY RELATIONS

Diverse groups of researchers have proposed that reciprocity should be instated as an ethos to domains such as science (Brewer & Johnson, 2023), education (Sabourin, 2013), food production (Miltenburg et al., 2022), land management (Dennis & Bell, 2020) and relations with Indigenous Peoples (Manosalvas et al., 2021). Reciprocity is a lens through which to evaluate and enact our relationships with other components of nature (Díaz & Pascual, 2025), our legal obligations to land and the rights of all living beings and relations (Armstrong et al., 2024; Fisk et al., 2025; Kanngieser & Todd, 2020). Reciprocity and relationality with nature are enabled by becoming educated in these relations, actively living and participating in these relationships in daily life and tending to spiritual and moral ethics (Greening, 2024). Reciprocity can fill academic knowledge gaps, curve epistemic injustice and contribute to transformative change for more harmonious human–nature relations. The question is how do we get there?

Reciprocity requires healthy relations between people and with nature. Given how histories of biological conservation and economic development have often adversely impacted IP and LC, building healthy relations with communities is a necessary first step to identifying pathways whereby living in harmony with nature can be achieved. While there are numerous efforts underway to strengthen relationships between non-Indigenous academics and Indigenous Peoples (e.g. Bannister, 2018; Reo, 2019; Wheeler et al., 2020), there is much room for improvement, learning and unlearning. As showcased here, increased collaboration between actors with different backgrounds and the implementation of reciprocal practices as management options can help improve current conventional approaches, normalising these practices and encouraging their proliferation (e.g. Alvarez et al., 2025). First, reciprocity between actors can be promoted as a core principle in science, education, land management, and relationships with IP and LC, NGOs, policymakers and practitioners. This requires recognising and recovering (or adopting) diverse ontological considerations about the world (and the languages in which they are expressed). Second, reciprocal contributions between people and nature can be valued and advocated, becoming part of governmental nature conservation commitments. Reciprocity is embedded in and manifested through stewardship practices. Giving more visibility to stewardship practices carried out by IP, LC and other knowledge holders such as small-scale farmers or foragers, in academia, the science–policy interface (Díaz & Pascual, 2025) and nature conservation policy could help support reciprocal relations, in addition to considerably enriching the evidence basis underpinning better relationships with nature. Academia and policy commonly focus on nature as resources but have often overlooked the relationships people establish and the practices they carry to maintain and enhance different aspects of nature. Future research should thus focus more on reciprocal contributions. Without falling into the exercise of validating other knowledge systems with scientific knowledge (Tengö et al., 2017), it is important to show that

they often, albeit not always, converge. Additionally, it is crucial to acknowledge that some—not all—of these practices and values encoding reciprocity are under risk of attrition worldwide, concomitant to broader patterns of knowledge erosion and cultural assimilation (Fernández-Llamazares et al., 2021; Scheidel et al., 2023). Climate and other global changes induce land changes that may reshape reciprocal relations in the future. It is therefore crucial to support the ongoing efforts of IP and LC around the world to maintain their cultural values and reciprocal ways of knowing and being.

Beyond reciprocity, committing to sharing properly whatever is taken with the variety of non-humans with whom we co-inhabit the world is a powerful mechanism to achieve social and environmental justice. This implies the rejection of resource accumulation for some and nothing for others (Lewis, 2008). Karen peoples in Thailand put forward ideas for co-constructing futures: 'If we can only receive by giving, then we must begin to give' (Phatthanaphraiwan & Greene, 2025). The ecological and social challenges we collectively, albeit differentially, confront today in the form of climate change, biodiversity decline and social injustice were created over hundreds of years of appropriation, structural violence on Indigenous, Afro-descendant and other frontline communities globally (Correia, 2024). To guide sustainability management in more ethical and equitable ways, we need to address these relations by recognising the existent inherited prejudice, power asymmetry and hierarchical status. Hence, it is necessary to imagine that rebuilding healthy relations will also take time. Whyte's (2020) work on the paradox of climate justice exemplifies this, as he notes that climate action must happen quickly but that a just approach requires slowing down and building trust with Indigenous Peoples who have lost faith in such endeavours. Working with this challenge requires centring IP and LC leadership and real participation in decision-making processes (Esbach et al., 2025). It also requires compromise that often means de-centring academic knowledges so that local expertise based on generations of adaptive management and stewardship can equally inform conservation practice and resource governance strategies. The tools and pathways already exist. It is now paramount to leverage academic resources and funding along with local expertise, science and Indigenous knowledge to build these healthy relations so they can nurture new pathways for truly sustainable and justice-focused social-ecological reciprocity.

AUTHOR CONTRIBUTIONS

Irene Teixidor-Toneu, Álvaro Fernández-Llamazares and Natalie C. Ban conceived the idea and wrote a first draft of the manuscript. All co-authors contributed insights and text to the manuscript, and revised and approved the final version.

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