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Research

Fostering care and agency for wildlife stewardship on Indigenous and local lands: the power of place, practice, and virtue

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ABSTRACT. Stewardship of wildlife within lands managed by Indigenous peoples and local communities has relied on traditional knowledge and skills yet faces challenges amid social and economic changes that can weaken enduring social-ecological relations. Wildlife conservation initiatives frequently lean on community-based wildlife management (CBWM) to foster sustainable use while ensuring community involvement in decision making. In practice, CBWM has often remained tightly linked to top-down or externally driven processes with quick negative conclusions being drawn about the capacity of communities to manage local wildlife, without further investigating the foundational conditions of stewardship. This study proposes a theoretical model for place-based stewardship that builds on the care-knowledge-agency framework, grounding it in mentored practices and environmental virtue. Our model does not discount the importance of devolved governance systems and legitimate leadership but highlights the parallel requirement for virtuous local decision-making processes, which emerge from mentored practice, rooted in place-based knowledge, and nurtured by care. We illustrate this model with case studies from Guyana and the Democratic Republic of Congo, drawing on lessons learned to develop a generic theory of change that can be adapted to guide the development of tailored interventions for the consolidation of stewardship in the context of CBWM. We argue that CBWM initiatives involving Indigenous peoples and local communities cannot view wildlife management as disconnected from strategies for self-determination within a context of reappropriation of customary lands and may require enabling actions to recover agency and place-based care through reconnection to the territory and mentored practice.

Key Words: *agency; care; community-based wildlife management; Indigenous peoples and local communities; knowledge; place; practice; self-determination; stewardship*

INTRODUCTION

Indigenous Peoples and local communities have long played vital roles as custodians of biodiversity, contributing to the conservation, restoration, and sustainable use of nature through their knowledge, practices, and enduring relationships with the environment (McGregor 2009, Larsen and Johnson 2017, CBD 2022, Dawson et al. 2023). They maintain an inter-generational historical connection to place and nature through livelihoods, cultural identity, languages, worldviews, institutions, and ecological knowledge (IPBES 2019). However, socioeconomic change, particularly the intensifying resource demands of the global economy, continues to substantially disrupt Indigenous Peoples' livelihoods, lands, and rights (Scheidel et al. 2023), often diluting traditional reciprocal and accountable social-ecological relationality (Tynan 2021). In such evolving open systems, governance is complex as traditional activities, social dynamics, and territorial boundaries are diminished (Kennedy et al. 2023).

It is often in these disrupted contexts that communities are approached by conservation agencies and programs with the goal of proposing sustainable wildlife management solutions. Recognizing the growing pressure on wildlife that Indigenous peoples and local communities depend on for their food security and socio-cultural construction, conservation managers often refer to community management models as an environmental governance approach that can enable communities to benefit from sustainable use and management of wildlife (Songorwa et al. 2000). Community-based wildlife management (CBWM) is viewed as able to generate management decisions that are better attuned to local settings (Berkes 2009) by involving people that are directly affected by these decisions (Pinkerton 1999, Sheppard and Meitner 2005) and by increasing equity in the decision-making process (Persoon and van Est 2003, Pagdee et al. 2006).

Successful CBWM should constitute environmental stewardship, understood here as responsible use of wildlife based on sustainable practices that advance human and ecological well-being (Chapin et al. 2010). These components are inherently interconnected. Nikolakis et al. (2023) introduced the concept of an "environmental stewardship-health nexus," highlighting that environmental stewardship programs provide health benefits for the body, mind, and spirit, as well as for the land and all living beings.

Although CBWM is often framed as a grassroots approach, in practice it has frequently been shaped by top-down or externally driven agendas (Büscher and Dressler 2012), where the primary aim is to secure local support for broader conservation goals rather than genuinely empower communities (Campbell and Vainio-Mattila 2003). Failures of CBWM projects are often associated with lack of local governance capacities and weak tenure systems that constrain local agency (Hakimzumwami 2000, Zyambo 2018).

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However, another potential reason for failure is that communities may lack interest or motivation to engage in wildlife conservation efforts (Songorwa 1999). Failures in practical applications of CBWM have led to quick negative conclusions about the capacity of CBWM to achieve conservation impacts (Campbell and Vainio-Mattila 2003). These conclusions often fail to consider whether the foundational conditions that allow communities to act as stewards were met in each context (Reo et al. 2017). In instances where these conditions are lacking, practitioners must identify and prioritize actions aimed at reestablishing and fortifying the social-ecological basis of stewardship before embarking on wildlife management initiatives (Nikolakis and Ross 2022).

This study provides a novel theoretical model of stewardship that can support future initiatives aimed at strengthening community-based efforts for the sustainable use of wildlife. We built on the framework developed by Enqvist et al. (2018), which identifies care, knowledge, and agency as core overlapping dimensions across diverse meanings of environmental stewardship. Care expresses the feelings of attachment and responsibility that underpin stewardship, while knowledge represents understanding of a given social-ecological system and the capacity to respond to and learn from its dynamics. Agency refers to the abilities and capacities of individuals and organizations to engage in stewardship action (Enqvist et al. 2018). We invoke theory from several disciplines to extend this model into a place-based stewardship framework grounded in mentored traditional practices and environmental virtue. We illustrate our model with insights from long-term case studies of wildlife use in Guyana and the Democratic Republic of Congo (DRC). Finally, we discuss how our proposed model can help practitioners articulate the rationale for their interventions by employing a theory of change that identifies tailored interventions needed to achieve effective wildlife stewardship as the desired impact.

METHODS

We built on the care-knowledge-agency framework proposed by Enqvist et al. (2018) to describe the components of stewardship, extending it with insights from recent literature and testing it through case studies of CBWM. Building on perspectives from multiple disciplines and practical experiences, we developed the conceptual model of place-based wildlife stewardship presented in this study.

First, we enriched the model by incorporating insights from the literature across several related fields, including environmental ethics (List 2013, Sandler 2013, Rogoff 2014, Shephard et al. 2023a, Shephard et al. 2024), stewardship (Chapin and Knapp 2015, Masterson et al. 2017, Bennett et al. 2018, West et al. 2018, Masterson et al. 2019, Ryfield et al. 2019, Nikolakis et al. 2023, Shephard et al. 2023b, McLeod et al. 2024), traditional knowledge systems (Bourke et al. 2018, Duncan et al. 2018, Kim 2019, Magaloni et al. 2019, Grey and Kuokkanen 2020, Turnbull et al. 2020, Kadykalo et al. 2021, Reed et al. 2021, Tynan 2021, Billiot et al. 2022, Kamelamela et al. 2022, Mackean et al. 2022, Nikolakis et al. 2023, Kennedy et al. 2023, Winter et al. 2023, Menzies et al. 2024), and natural resource governance (Zyambo 2018, Kadykalo et al. 2021, Springer et al. 2021, Tong 2022, Zhang et al. 2023).

Then, we used two case studies to test and refine the conceptual model: the Wapichan territory in Guyana and the Turumbu communities in the Democratic Republic of Congo. Applying the model to contrasting social-ecological contexts and governance systems enabled us to assess its relevance and adaptability. Insights from both cases helped to elucidate the interrelationships among the model's core components and to enhance its conceptual robustness.

These cases were purposely selected to represent contrasting experiences of Indigenous and local community stewardship in the context of CBWM under different social-ecological and governance conditions. Selection was also informed by the sustained engagement of co-authors in both regions, either as researchers or community members with long-term field experience. Data sources included academic and grey literature, as well as field-based documentation from two wildlife management projects active in each region. The case study in Guyana drew on reports, publications, and experiences from the Sustainable Wildlife Management (SWM) Programme in Guyana, while the case study in the DRC was informed by the Training, Research, and Environment Project in Tshopo (FORETS). Information gathered over the years for both projects included various methodologies, such as group discussions, interviews, participant observation, historical trend analysis, and traditional knowledge mapping.

Based on a collective effort by the authors to discuss the practical implications of the refined model, we developed a theory of change using a backcasting approach, which involves working strategically backward from a commonly identified goal to determine the conditions and steps needed in the present to achieve it (Holmberg and Robèrt 2000). The outcomes of the theory of change were derived from the conceptual model developed in this study. The outputs and enabling actions were formulated through a participatory and collaborative process among the co-authors, drawing on insights from the two case studies. These included both documented experiences and reflections from local communities, as well as the lived knowledge of Indigenous and practitioner co-authors directly involved in stewardship efforts.

To structure and visualize the theory of change, we conducted three online workshops in which co-authors collaboratively defined and refined its components and causal linkages. These sessions focused on mapping the relationships between enabling conditions, intermediate outcomes, and long-term impacts. We used Lucidchart, a web-based collaborative diagramming tool, to co-create, edit, and visually represent the evolving theory of change (https://www.lucidchart.com/).

The refinement of the theory of change followed an iterative process informed by principles of grounded theory (Turnbull et al. 2020), triangulating insights from academic literature with applied experiences documented in the case studies. The process was informed by the theoretical foundations used in developing the conceptual model, complemented by practical frameworks in wildlife management and established methodologies for applying theory of change in projects (Decker et al. 2005, UNDG 2011, Parsons et al. 2013, Prinsen and Nijhof 2015, Cooney et al. 2018, IUCN 2021, Challender et al. 2025, ILO [date unknown]).

CONCEPTUAL MODEL FOR PLACE-BASED STEWARDSHIP OF WILDLIFE

Adding to the Enqvist model of stewardship (Enqvist et al. 2018), we suggest that care, knowledge, and agency cannot be disconnected from the notions of place, mentored practice, and virtue. Place, practice, and virtue are deeply interconnected in Indigenous and local stewardship, shaping individuals' responsibilities and relationships with their environment (Menzies et al. 2024). Place is more than a physical location; it is a lived, dynamic space where social and ecological relationships are cultivated through traditional practices, reinforcing community identity and ecological knowledge (Gieryn 2000). Mentored practice serves as the foundation for developing environmental virtue, as hands-on learning with elders fosters stable personal dispositions and communal expectations, ensuring that sustainable interactions with nature become ingrained in both individual and collective behaviors (Billiot et al. 2022). This interconnected framework enables individuals and communities to exercise agency in stewardship by combining care, practical knowledge, and ethical commitment to sustaining their territories, despite external pressures and social-ecological changes.

The notion of place: linking people, wildlife, and space through continuous practice

Managing wildlife within Indigenous and local lands cannot be achieved in isolation from a thorough understanding of "place." The segmentation of people, place, and wildlife often presumed in conservation science has compromised wildlife conservation initiatives searching to promote sustainability (Cooke et al. 2016). Indeed, Indigenous peoples and local communities typically understand wildlife as an intrinsic component of their territories (Winter et al. 2023). The Indigenous notion of territory is consistent with the notion of place, a system co-produced by ecological and cultural processes, reflecting biocultural rights (Ryfield et al. 2019). In this mode, place is different from space: "Space is what place becomes when the unique gathering of things, meanings, and values are sucked" (Gieryn 2000:465). Place is understood instead as the combination of interactions between space, living beings, natural and artificial objects, and geographical forms where values, social interactions, power relationships, cultural constructions, identity, and interpretations emerge (Gieryn 2000).

Place-based knowledge is grounded in practice

Personal formation in many Indigenous and local communities is often linked to acquiring traditional place-based knowledge and skills under the tutelage of wise mentors (Ohmagari and Berkes 1997). Activities such as hunting are challenging and uncertain and so learning intrinsically extends to developing an intuitive feeling for ecological processes in a specific place, e.g., how environmental variability might shape target animal behavior (Shephard et al. 2024).

Knowing how to subsist efficiently in a stochastic natural environment not only requires unique and site-specific knowledge, but also the capacity to use this knowledge through practical skills and the ability to understand associated beliefs, rules, taboos, and the cosmovision of a society (Berkes et al. 2000). These processes are at the core of traditional ecological knowledge (TEK), and their successful transmission through generations is fundamental to the perpetuation of subsistence livelihoods.

Knowledge arises from traditional practices, or tasks, which become constitutive acts of dwelling in a place. The experience of dwelling expresses embodied and often multi-generational coexistence of people and wildlife through ongoing patterns of practice across a so-called "taskscape" (Ingold 2000). The taskscape is a network of evolving activities and interactions that continuously shape a space, highlighting the ongoing relationships between people and the natural world (Ingold 2000). Ingold (2000) suggested that such technical tasks are embedded in the "current of sociality," the ongoing flow of social relationships and interactions, making traditional practices and associated TEK the primary context for grounding an actor in their place and community, i.e., social-ecological system.

Environmental virtue arises from mentored practice

We consider virtue to be a stable personal disposition to act rightly, doing the right thing, in the right way, at the right time, with an orientation toward the common good (Brown et al. 2010, Gram-Hanssen 2021). Here, the common good is understood as both human and ecological well-being (Chapin et al. 2010). In this Aristotelian sense, virtue is cultivated through striving for excellence in complex practical tasks, such as traditional practices, under the guidance of wise mentors (List 2013). Mentored practices are communal traditions embedded in daily life within a specific place, transmitted through hands-on learning with experienced elders (Ohmagari and Berkes 1997). These practices foster stable personal dispositions (habits) and communal expectations, reinforced by grassroots social norms that incentivize virtuous behaviors in social-ecological commons (Magaloni et al. 2019, Throsby and Petetskaya 2016).

In the context of Indigenous and local stewardship for wildlife, learning outdoor skills and ecological knowledge within a local "community of practice" helps individuals develop environmental virtue, understood as good ecological choices and habits oriented toward the well-being of both people and wildlife (List 2013, Sandler 2013). This learning process often involves observing and actively participating in traditional practices (Rogoff 2014). The habituation of these practices under the guidance of wise mentors carries explicit moral and spiritual dimensions, linking individuals, community, tasks, wildlife and other natural resources, and place (Ingold 2000). Developing proficiency in these practices supports children in adopting responsibility for the well-being of their community and environment (Rogoff 2014). Moreover, learning from community mentors serves as a pathway to progressively assuming responsibility for the stewardship of both human and ecological communities (Fernández-Giménez et al. 2019). This perspective highlights the importance of enabling community-level actions, including the revival of traditional knowledge and skills (Winter et al. 2023), as a means to fostering wildlife stewardship.

Care emerges from the positive attributes derived from place

Songorwa (1999) pointed out that communities are not always interested and willing to conserve wildlife, suggesting that lack of care could hinder stewardship. The notion of care emerges from the way people derive significance, attitudes, symbols, principles, and emotions from the object of care (Stenseke 2018). It frequently elicits the desire to look after a particular social-ecological system (Shephard et al. 2023b, 2024). The element of care helps motivate people to use local knowledge and skills to look after their social-ecological system (West et al. 2018,

Shephard et al. 2023b, Shephard et al. 2024), within which they can experience a complex dynamic of relationality (Ingold 2000, Cooke et al. 2016).

Sense of place can be interpreted as a spatially explicit form of care that is linked to personal and social identity (Bramston et al. 2011). Nature and wildlife evoke feelings and emotions in individuals based on their interactions with the environment, such as through traditional practices like hunting; individuals can develop a strong attachment to local creatures upon which they depend for their well-being and livelihood. Individuals form their values and identity through shared beliefs, practices, and knowledge learned from social interactions within their place. Values or positive attributes assigned to a place are defined by Beckley (2003) as "magnets" as they keep people happily attached to a place, although only positive attributes are real predictors of care (Davenport and Anderson 2005, Masterson et al. 2019).

In Indigenous cosmovision, care often arises as a reciprocal relationship where people care for the place and the place cares for them (Nikolakis et al. 2023). In this context, sense of place becomes intrinsically linked with the Indigenous notion of well-being which is viewed as a manifestation of the interrelationships among individual, collective, and environmental domains sustained over time, often referred to as "relational well-being" (Mackean et al. 2022).

Transformative agency requires devolved governance and virtuous leadership

Care alone is insufficient for stewardship, because motivations do not or cannot always translate into actions (Chapin and Knapp 2015) that render change in a given place (Enqvist et al. 2018, Shephard et al. 2023b). Crossing the care to action gap thus requires agency, determined by institutions and norms that empower participants to translate their knowledge and skills into actions (Bennet et al. 2018). Transformative agency is driven by the overall capacities of local communities to manage and control their territory, producing positive outcomes (Kamelamela et al. 2022).

According to Chapin and Knapp (2015) and following Ostrom (1990), local capacities for place-based stewardship depend on clearly defined community boundaries, opportunities for meaningful participation in decision making, rules aligned with local ecological conditions, mechanisms for accountability, equitable resource use, and effective systems for conflict resolution (Ostrom 1990, Dietz et al. 2003, Chapin and Knapp 2015, Springer et al. 2021, Tong 2022). Social capital and collaborative resource monitoring are also key components of local agency (Dietz et al. 2003). Social capital refers to the capacity of local communities to maintain communication and dense social networks as a basis of trust, which can be incentivized and facilitated by good or virtuous leadership (Begay et al. 2007). This societal outcome reduces the cost of monitoring individual and group behaviors and increases rule compliance (Dietz et al. 2003).

This framing implies that management authority is devolved by higher-level government, but it also requires a bottom-up individual process because it is the virtuous leader who will tend to act for the common good when circumstances permit (Crosby and Bryson 2005). Our model does not discount the importance of devolved governance systems (Zyambo 2018) but highlights the parallel requirement for virtuous local decision-making processes and leadership (Begay et al. 2007). This grassroots component of agency may maintain internal (emotional and psychological) and external (social and economic) incentives to act for the greater good of the community and local wildlife resources (List 2013).

Care for a place and the personal virtue expressed as good ecological habits will not necessarily produce stewardship outcomes if individual motivations and behaviors do not translate into a set of local rules and effective grassroots organization oriented toward governing the commons (Enqvist et al. 2018). We therefore invoke environmental virtue as the necessary linking concept by which place-based and mentored practices bear fruit in care and practical knowledge that is empowered by personal agency and expressed as positive behaviors toward wildlife (Shephard et al. 2023b, 2024).

External pressures and social-ecological changes

External disturbances can have a substantial impact on a place, modifying its material and social components, diminishing traditional embedded knowledge and skills (Shephard et al. 2023a, b, 2024), and shifting the values that people attribute to that place (Windsor and McVey 2005, Masterson et al. 2017). Sense of place can be influenced by external factors that induce impacts such as wildlife loss or diminished opportunity for nature encounter (climate change, urbanization, new economic activities, etc.) and thus impair the capacity of a place to continue to support meaningful relationality, provide ecosystem services, or maintain a functional taskscape (Masterson et al. 2017)

Changes in traditional livelihoods due to forest degradation might shift sense of place as dependence on natural systems decreases along with the loss of knowledge and skills and traditional mentoring pathways (Bhushan et al. 2024). Migration has been described as a factor influencing sense of place because it has a direct impact on social and cultural identity. Chapin and Knapp (2015) suggest that mobility can challenge stewardship agency by increasing heterogeneity in place values, identities, and dependencies.

Transformations of the land have adversely impacted the mental health and well-being of Indigenous and local communities (Nikolakis et al. 2023). The term "solastalgia" has emerged to describe the distress experienced by people deeply attached to a place that sustains significant environmental changes, leading to cumulative mental, emotional, and spiritual health effects (Albrecht et al. 2007, Galway et al. 2019). Literature on solastalgia highlights it as a place-based experience and notes that its effects can vary, particularly affecting women, elders, and Indigenous people (Galway et al. 2019). Additionally, hunters experience elevated risks of mental health impacts when significant environmental change threatens their place-based identities (Nikolakis et al. 2023).

According to Bennett et al. (2018), agency is not only driven by intrinsic local and personal capacities (which we link to virtue) but is also a function of broader governance factors understood as systems of institutions (e.g., regulations, formal and informal organizations, and decision-making processes) and power relations influencing the sense of agency (e.g., inequality, discrimination and exclusion from decision-making, unrecognized

territorial rights). Communities may have local capacities to manage their place, but their territorial rights, as well as their institutions, may not be legally recognized and legitimized by governments. This lack of formal recognition of rights disempowers a community's capacity to exercise its biocultural rights. Studies from psychology have highlighted the connection between agency and Indigenous well-being, particularly in contexts with colonial histories. Improved well-being outcomes, especially related to mental health, such as reduced suicide rates, are linked to enhanced community autonomy and decision making (Bourke et al. 2018).

CASE STUDIES OF PLACE BASED STEWARDSHIP

The Wapichan Wiizi, Rupununi, Guyana

The Wapichan Wiizi

The Wapichan Wiizi (territory) encompasses the full extent of the Wapichan people's traditional lands in the South Rupununi, Guyana. This territory hosts a rich diversity of ecosystems, including extensive tracts of primary forest, gallery forests, open and wooded savannahs, and seasonally flooded wetlands. It includes 21 Wapichan communities, of which 20 are still pursuing new land titles or extensions to existing ones, as previous demarcation processes did not cover the full extent of their customary lands (SRDC 2024). Wapichan livelihoods are grounded in fishing, hunting, livestock rearing, and the cultivation of fruit trees (Henfrey 2002).

Customary identity and care for wildlife

The Wapichan people's identity is deeply rooted in their customary territory, shaped by direct interactions with the land and collective beliefs passed down through generations. Their livelihoods are intricately connected to wildlife, which is used for food, medicine, crafts, and cultural practices. Hunting grounds provide bush hogs, land turtles, tapirs, and bush deer, among others. Animals are also central to Wapichan spiritual beliefs, where grandfather spirits, seen as wise ancestral mentors, are respected and honored (SRDC 2012).

Personal relationships with wildlife are nurtured through social customs, emotions, and intergenerational knowledge. The Wapichan's commitment to traditional practices, farming, weaving, healing ceremonies, and sustainable resource use demonstrates their care for both cultural heritage and environmental stewardship. Sacred sites are protected, and ancestral knowledge is actively passed down, strengthening resilience and territorial ties (Gomes and Wilson 2012).

Knowledge transmission and virtuous behaviors

Knowledge about wildlife and related skills is transmitted through daily practice under the guidance of elders and mentors. Van Vliet et al. (2022) found that Wapichan children remain highly engaged in subsistence activities and retain many practical skills. Adolescents are proficient foragers and continue to refine complex techniques such as hunting into adulthood (Lew-Levy et al. 2017). Traditional tools like the bow and arrow are still commonly used and symbolically significant, especially for boys (van Vliet et al. 2022). Although subsistence is driven by necessity, it also fosters skill development and enjoyment. Beyond the practical, youth learn important cultural codes through initiation rituals such as ant stinging and scarification, which build endurance and hunting skills. These rites teach customs, taboos, dietary restrictions, spiritual locations, and respectful behavior toward game animals (FAO 2022).

Virtuous behavior toward animals is central to becoming a "good hunter." As noted in the Wapichan Management Plan (SRDC 2012), hunters require special knowledge of animals and their spiritual dimensions. Shamans (*marunanao*) guide these practices, advising on taboos related to hunting and wild meat consumption, especially in relation to childbirth, menstruation, and pregnancy (Gomes and Wilson 2012).

Partial recognition of Wapichan agency

The Amerindian Act of 2006 grants village councils authority to manage titled lands, including drafting rules for natural resource use. However, this recognition only applies to formally titled areas. Post-independence land titling processes fragmented customary territories, allocating land to individual villages. In 1967, Wapichan leaders petitioned for collective title to their entire territory, yet to this day, only around 15% is formally titled (IWGIA 2020).

This legal gap undermines Wapichan participation in conservation policy and decisions about mining concessions. As a result, Indigenous knowledge systems are fragmented, and their voices often excluded (MacDonald 2018). Nevertheless, Wapichan leadership and shared identity provide strong social capital. Village Councils, as traditional authorities, continue to manage natural resources under customary law, including restrictions on hunting, species protection, and obligations to share meat. These rules are transmitted orally and enforced by community mechanisms (FAO 2022).

Local institutions also mediate land and resource conflicts. Family and community groups have clear rights and responsibilities over the areas they inhabit and use. Under customary law, Wapichan people freely access their territory for livelihood needs (David et al. 2006). These internal capacities have fostered strong governance institutions, but effective stewardship also depends on formal recognition by external institutions (Bennett et al. 2018). Currently, this remains a key unmet condition.

Advancing formal recognition of the Wapichan Wiizi

Since 2000, the Wapichan have taken active steps to assert jurisdiction over their territory. They initiated a participatory mapping process to define territorial boundaries and identify rights holders. Guided by elders, this effort included mapping sacred sites, burial grounds, hunting areas, and wildlife zones, using Wapichan language and traditional knowledge (Forest Peoples Programme 2012, Baker 2014).

Beyond its legal utility, mapping revived cultural connections to the land: "We climbed mountains, traveled along creeks, and followed our traditional trails" (Gomes and Wilson 2012). It also laid the groundwork for collective territorial management aligned with spiritual beliefs, leading to the Wapichan Management Plan: Thinking Together for Those Coming Behind Us (2012).

In 2023, the Wapichan launched the Wapichan Wiizi Wildlife Management Plan, articulating a shared vision for conserving wildlife and ensuring sustainable use. This included the first community-led biocultural assessment of Karawaimiin Taawa,

an ecologically rich area at the headwaters of the Rupununi and Kwitaro rivers, currently under threat from mining. The plan affirms that self-determination and legal territorial recognition are essential for wildlife conservation (CIFOR-ICRAF et al. 2024).

Additionally, the South Rupununi District Council signed a Memorandum of Understanding with the Guyana Wildlife Conservation and Management Commission (GWCMC) to establish a wildlife checkpoint at Saurab Bridge in Shulinab village. This agreement authorizes community officers to inspect permits and wildlife being transported, enhancing local governance capacity (FAO 2023).

The Turumbu around the Yangambi Landscape in the Democratic Republic of Congo

The Turumbu customary territory

The Yangambi Biosphere Reserve (YBR) is in Tshopo Province of the Democratic Republic of Congo (DRC), about 100 km west and 62 km north of the city of Kisangani. It was established in 1976 during the colonial period and covers 235,000 ha (Koy et al. 2019, Nowak 2019). Turumbu Indigenous people inhabited the area before the establishment of the reserve and practiced customary hunting, fishing, agriculture, logging, and collection of non-timber forest products (Koy et al. 2019). Agriculture is the main economic activity in the Yangambi though it is constrained by low yields and soil fertility. Forest resources, especially wild meat, are key to ensure local livelihoods and food security (Nowak 2019). Local land ownership for Turumbu and other communities living in the Yangambi relies primarily on customary rights (Koy et al. 2019).

Disrupted Place-based agency in the face of colonial and post-colonial conflict

Historically, the arrival of Europeans, with their religious influence, forced displacement policies and centralized authority across Central Africa (Ocheni and Nwankwo 2012). Their monotheistic Western religion weakened and altered cosmologies and traditional practices related to resource management (Hickey 2007). This significantly contributed to the desacralization of customary practices in hunting, agriculture, and fishing (Juhé-Beaulaton and Roussel 2003, Baco et al. 2007). At its creation in 1939, the Yangambi Floristic Reserve was inhabited by the Turumbu Indigenous communities who practiced their customary hunting, fishing, agriculture, and artisanal logging activities as well as the collection of non-timber forest products. The survival of these autochthone people depended mainly on the forest. During the colonial period, the Turumbu were largely hired by the National Institute for Agronomic Study in the Belgian Congo (INEAC) as workforce for their agricultural plantations. The Turumbu progressively abandoned their traditional hunting and slash and burn agriculture and became more sedentarized (Koy et al. 2019).

After independence, in 1976, the creation of Yangambi Biosphere Reserve and the gazetting in 2003 of a logging concession further excluded the Turrumbu from their customary land. Though Turumbu people recognize forest areas in the reserve as their customary property, the lands are formally state owned. The lack of formal recognition of customary ownership by Turumbu has resulted in communities lacking capacities to exclude non-right holders from the use of resources within their customary territory (Koy et al. 2019, Nowak 2019, van Vliet et al. 2019). During the conflicts between 1996 and 2003, armed groups occupied the Turumbu forests, relying on wild meat for food and being involved in trafficking meat, skins, and ivory. The uncontrolled use of wildlife by armed groups eroded local customary governance systems (van Vliet et al. 2019). During that period, significant decline of game species was observed, and the local extinction of key species such as elephant and okapi took place (van Vliet et al. 2018).

Despite the radical transformations of the Turumbu agency over their territory and their resources throughout history, traditional leaders still play a major role in local territorial management (Battory and Vircoulon 2020). Customary chiefs are hierarchically organized in the form of sector/group/village chiefs, and clan leaders. Hunters native to a group hold the right to hunt in the land of their ancestors. Foreign hunters require permission from the group chief to hunt over the area of his jurisdiction and must pay a customary charge (Mpoyi et al. 2025).

Economic crisis, resource depletion, and the erosion of attachment to place

The political instability imposed by the war since 1996 has led to long-lasting economic crises with indirect impacts on wildlife and place attachment as a basis of care. Lack of transportation and closures in factories caused limited access to meat supply from domestic animals leading to more dependency on forest resources. As a result, traditional subsistence hunting transitioned toward more structured market chains to cover increasing demand for meat in growing neighboring towns (van Vliet et al. 2019, Shephard et al. 2023a).

Hunting practices intensified to increase yields, with the adoption of headlamps enabling both day and night hunting, extended multi-day trips, the use of locally made firearms and cartridges, and widespread deployment of wire traps. Traditional tools like spears, bows, and liana-based traps are now rarely used. Meanwhile, the number of wildlife traders has surged from around 15 in the 1990s to over 200 today (Van Vliet et al. 2019). Turumbu hunters sell more than 80% of what they hunt, favoring the cash economy and threatening their food sovereignty. Though this change had positive impacts regarding household income, it has also drastically diminished wildlife (Van Vliet et al. 2019). Moreover, people in rural villages experience food shortages and more than a third of the population have diets below or near the necessary levels (Nowak 2019).

The loss of knowledge and its impacts in care, virtue, and agency

Before the consecutive wars, customary norms regulating hunting and wildlife use among the Turumbu were deeply rooted in the traditions, ecological knowledge, and cultural practices (Koy et al. 2019). Among the Turumbu tribe, Mpoyi et al. (2025) showed that 43 animal species were prized for political (collection of insignia of power), zootherapeutic, and social regulation purposes (customary rites, (dis)enchantment, etc.) and 27 of them were prohibited from being commercially hunted to avoid undermining sacred customs. Some of these species and their parts were used as a symbol of authority, endurance, vision, and wisdom (Mpoyi et al. 2025)

Although these customary norms and practices are still present in the Turumbu discourse, in practice, there is strong evidence of a decline in traditional knowledge and skills among younger generations, especially associated with ethnic medicines and wildlife taboos (Shephard et al. 2023a). The decline of local knowledge, skills, and shared practices undermines environmental care and virtue (Shephard et al. 2023b, 2024). Mpoyi et al. (2025) also found a generational gap in compliance with customary bans on sale; older people tend to comply whereas new generations generally do not. Mpoyi et al. (2025) highlights the challenge that this poses in terms of the hereditary nature of customary rules, when elders who are supposed to act as mentors do not themselves comply. A linked issue is the disappearance of customary ceremonies which has led to the sale of certain species that were previously prohibited from trade because of their spiritual values (Mpoyi et al. 2025).

Though there is still knowledge of the customary rule, there is no reinforcement through mentored practice, which ultimately builds the behavior as a moral duty. Such loss of knowledge and adherence to customary rules, along with diminished mentoring pathways, have serious implications for wildlife management. The loss of knowledge and practice along with the mixing of cultures have threatened rule enforcement. Customary courts have been abolished, diminishing agency by traditional authorities (Mpoyi et al. 2025). The acquired excellence in practice and associated behavioral norms that shape virtuous behavior are much less likely to be transmitted in this context. This loss may diminish the integration of place-based practice, care, knowledge, and agency that we suggest is key to good stewardship. Moreover, as the social role of subsistence hunting embedded in a place-based identity shifted with the new market dynamics, people also have less capacity for assessing the ecological state of their place (Shephard et al. 2023b). This has repercussions in their ability to establish robust monitoring systems relevant to place-based agency (Luzar et al. 2011).

Re-establishing healthy wildlife populations and recovering traditional knowledge among the Turumbu

In the Turumbu customary land, the depletion in wildlife fuels a vicious cycle contributing to the degradation of stewardship. To reverse the trend, in 2023, the provincial Ministry of Environment engaged with the community and other stakeholders for the development of a 5-year wildlife management plan for the Yangambi landscape, which actively recognizes the role of communities in the establishment of village-level wildlife rules and the need to restore levels of wildlife that allow for sustainable use. Indeed, recovering availability and access to traditional foods, such as wild meat, have proved positive impacts on social, emotional, spiritual and physical health, and well-being (Cubillo et al. 2020, Nikolakis et al. 2023).

The plan highlights the importance of reducing pressures on wildlife by re-establishing conditions for people to invest in livestock production as before the wars. This is done through better access to business training, micro-credit opportunities, and access to resilient breeds. The wildlife management plan in Yangambi also relies heavily on the re-establishment of motivations and behaviors for stewardship action based on care and virtue, in which the recovery of traditional knowledge and mentored practice is the key element. An example of an enabling action toward this end, is the work done by SOWILD (Solutions for Wildlife), a grassroots NGO that started the establishment of the youth clubs (Club Zamba) in collaboration with schoolteachers. These Club Zamba engage groups of children in wildlife and forest issues through traditional knowledge, mentored practice, and experiential learning that further develop moral obligations toward wildlife stewardship. Through mentored learning, the clubs facilitate passing traditional beliefs and knowledge to new generations, fostering the recovery of social identity in connection to wildlife and place, and promoting positive place values (Nyumu 2024). Reflections on the case studies

The Wapichan case study exemplifies a community with strong preservation of TEK. Although the territory is influenced by some external factors, the system remains healthy with relative abundance of wildlife populations, positive place attributes, and strong social connections under a collective Wapichan identity based on traditional beliefs and knowledge that dictate good ecological habits promoted by strong leadership. However, top-down recognition of agency is still missing as territorial rights have not been legally recognized over much of the customary area. Enabling actions to enhance stewardship over wildlife include further recognition of all the extent of Wapichan customary land, and the recognition of the Wapichan people as legitimate partners to Guyanese governmental institutions, including the Guyana Wildlife Conservation and Management Commission.

In contrast, the case of Turumbu people in DRC is contextualized by a history of colonial exclusion and post-colonial displacement. The gazetting of the Yangambi Biosphere Reserve and a logging concession over Turumbu land, combined with armed conflict, political instability, poverty, and rapid population growth, have all contributed to the erosion of all the necessary factors to enhance environmental stewardship. These external factors have significantly eroded agency, traditional knowledge and skills, and the values or positive attributes of the place in connection to wildlife. In this context, the recovery of traditional practices helps promote positive cultural, socioeconomic, and nutritional values derived from wildlife resources, thereby strengthening place attachment and care. Enabling actions to reestablish care among the Turumbu people have also included efforts to restore wildlife populations to sustainable levels and reduce poverty cycles through the promotion of alternative income sources. In contexts of poverty, it is important to recognize that reinforcing well-being and resilience has positive implications for care and, in turn, that care can further enhance stewardship and sustainable use (Cubillo et al. 2020, Nikolakis et al. 2023).

THEORY OF CHANGE AND ENABLING ACTIONS TO REINFORCE WILDLIFE STEWARDSHIP

Based on the case studies and the conceptual model (Fig. 1), we propose a generic theory of change (Fig. 2) that translates the conceptual framework into a practical planning and evaluation tool for wildlife stewardship initiatives. In this theory of change, place-based stewardship for wildlife is defined as the ultimate desired impact, understood as the indivisible connection between human, wildlife, and ecosystem health and well-being. The outcomes were developed following a logical structure informed by the conceptual model and the literature that supports it. The outputs and enabling actions emerged through a participatory

Fig. 1. Conceptual model for place-based stewardship of wildlife. This model builds on the care–knowledge–agency framework (Enqvist et al. 2018), grounding it in Indigenous and place-based perspectives. Care reflects emotional attachment and responsibility toward place and wildlife; knowledge refers to the practical and ecological understanding that informs action; and agency includes both institutional empowerment and personal virtue, the capacity to act for the common good. These elements are dynamically linked through an ethic of virtue, which is nurtured through mentored, place-based practices.

and collaborative process among the co-authors, drawing on empirical insights from the two case studies and iterative revisions using relevant literature. The theory of change thus reflects a dual logic: a top-down process driven by theoretical and empirical literature, and a bottom-up process grounded in evidence from the case studies and the authors' own experiences.

Although the outcomes and outputs in the theory of change aim to comprehensively reflect the conditions necessary for the emergence of wildlife stewardship, the enabling actions are presented as illustrative examples of foundational interventions that can be adapted and implemented within community-based wildlife initiatives or co-management programs. Although Figure 2 distinguishes outcomes, outputs, and enabling actions as contributing to the development of place-based care, virtue, and agency, we acknowledge that many of these elements are interconnected. Several outcomes, outputs, and actions contribute simultaneously to more than one domain. Similarly, the diagram does not include directional arrows linking enabling actions to specific outputs, or outputs to specific outcomes, as these relationships are not linear. In practice, multiple enabling actions may support the same output, and a single output may contribute to multiple outcomes. Therefore, the design and application of the theory of change in specific contexts should consider and adapt to these interlinkages, ensuring that interventions are grounded in the realities and dynamics of each place.

Impacts

Place-based stewardship at the top of Figure 2, is the ultimate impact resulting from the alignment of motivations (care), an ethical orientation toward the common good (virtue), as well as individual and collective capacity to act (agency). When these elements are in place, communities are more likely to engage in wildlife stewardship action, which, over time, contributes to the resilience of social-ecological systems and supports the flourishing of both human and non-human life in the face of external pressures. The figure illustrates a feedback loop between place-based stewardship and care, highlighting how improvements in human and ecological well-being can, in turn, deepen the sense of care, as people derive values and positive attributes from their environment (Beckley 2003, Davenport and Anderson 2005, Masterson et al. 2019).

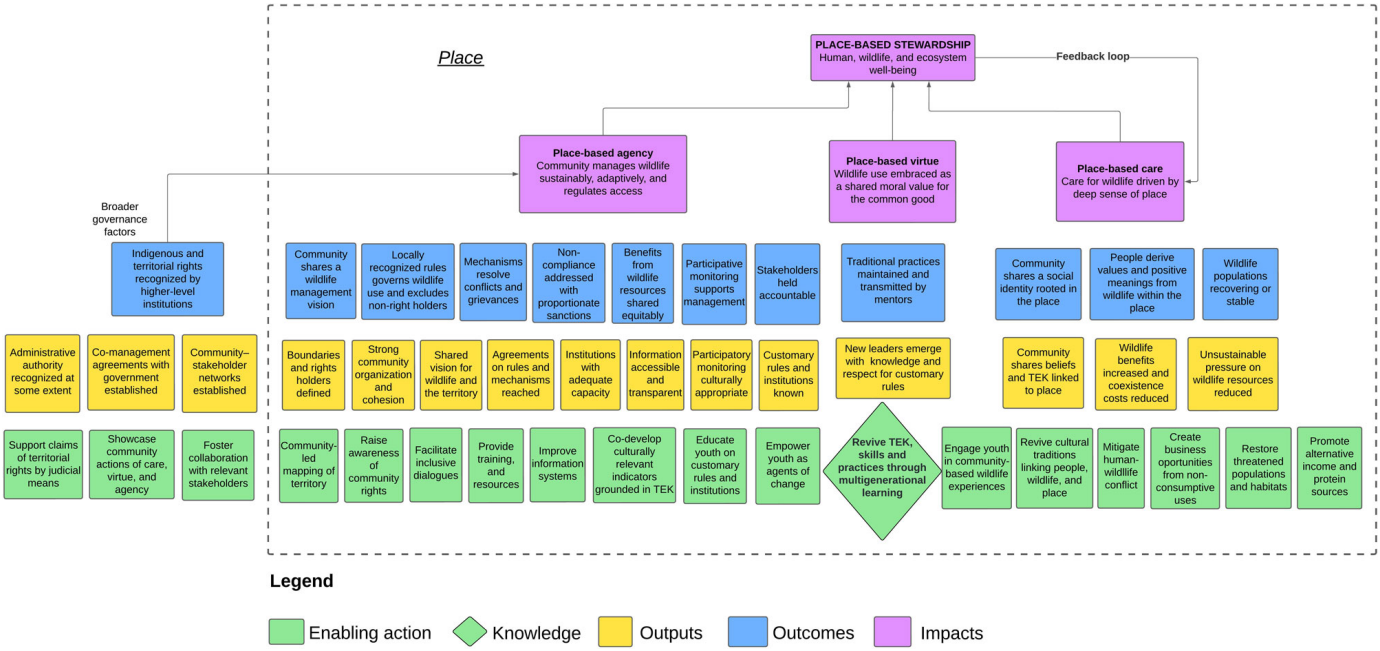
Outcomes

Outcomes represent the necessary conditions through which the impacts of place-based care, virtue, and agency are realized. In Figure 2, outcomes are shown as blue squares and reflect medium-term social, institutional, and ecological changes that operationalize the core dimensions of the conceptual model (Prinsen and Nijhof 2015). Each outcome contributes directly to cultivating care (e.g., through shared values and identity), enabling virtue (e.g., through moral formation and intergenerational knowledge), or strengthening agency (e.g., through collective governance and accountability mechanisms). One outcome, "Indigenous and territorial rights recognized by higher-level institutions," is depicted outside the dashed-line box representing "place," to highlight that its achievement depends on broader legal and political structures beyond community control but remains key to fully realizing place-based agency.

Outputs and enabling actions

In Figure 2, outputs (represented by yellow squares) and enabling actions (represented by green squares) are presented in general terms to encompass a broad range of elements that contribute to the overarching impact of place-based wildlife stewardship. This broad framing is intentional, reflecting an effort to identify foundational, bottom-up enablers that can be adapted across diverse cultural, ecological, and institutional contexts, and to support a long-term vision of stewardship. However, in practice, community-based wildlife management interventions are typically more targeted and context-specific (Cooney et al. 2018). Outputs represent the tangible products or services that directly result from program activities and serve as the operational foundation for achieving outcomes (UNDG 2011, Parsons et al. 2013, IUCN 2021). As such, they should be specific, measurable, and time-bound to ensure effective monitoring and evaluation (ILO [date unknown]). For example, the output in Figure 2 labeled "Strong community organization and social cohesion" is presented in broad terms as a prerequisite for the development of wildlife governance institutions, rules, and mechanisms. In practical terms, this output should be translated into concrete,

Fig. 2. Theory of change for wildlife stewardship. Theory of change linking care, virtue, and agency to the impact of place-based wildlife stewardship. Outcomes (blue), outputs (yellow), and enabling actions (green) represent interconnected elements drawn from literature and case studies. Knowledge (rhombus) forms the foundation, supporting non-linear pathways toward stewardship grounded in local values, governance, and intergenerational practice. The outer framework (dashed line) delineates the "place," while the components shown outside it represent broader governance factors influencing agency.



verifiable deliverables, such as "councils for wildlife or natural resource management are formed or reactivated, with defined roles, responsibilities, and decision-making procedures," or "a schedule of regular inclusive community meetings is established and followed."

Outputs and enabling actions to develop care and virtue

In Figure 2, knowledge appears at the bottom and center of the theory of change, represented by a green rhombus ("Revive TEK, skills, and practices through multigenerational learning"). The revival of TEK is positioned as a foundational element of place-based virtue, as it enables the emergence of new leaders equipped with culturally appropriate knowledge. Over time, this facilitates the habituation of traditional practices in the place, transmitted through mentorship by elders. These processes contribute to the impact whereby sustainable wildlife use is internalized as both a personal disposition and a collective norm, oriented toward the common good.

The revival of TEK skills and practices through multigenerational learning is also a basis for developing care toward the place. It promotes the intergenerational sharing of beliefs and TEK connected to place, which in turn contributes to the formation of a shared social identity, a key component in fostering a sense of place and motivating care for both wildlife and the broader territory. Enabling actions to reestablish care can also include efforts to restore wildlife populations to sustainable levels and break cycles of poverty.

These actions include the promotion of alternative income sources, the development of business opportunities from non-consumptive uses of wildlife, and measures to mitigate human-wildlife conflict. Collectively, these actions contribute to the stabilization and recovery of wildlife populations by reducing unsustainable pressures on local fauna. At the same time, they help increase the benefits derived from wildlife while reducing the costs associated with wildlife interactions (e.g., crop damage or livestock loss). This shift enhances the perceived value of wildlife and fosters the development of positive place-based associations, reinforcing care by strengthening the emotional, cultural, and livelihood ties between people and the local environment.

Outputs and enabling actions to develop agency

Figure 2 outlines a range of outputs and enabling actions that contribute to strengthening place-based agency. These include both local-level strategies and actions aimed at securing broader institutional recognition. Within the "place" box, enabling actions such as educating younger generations on customary rules and facilitating inclusive dialogues help reinforce traditional governance systems, support institutional agreements, and foster a shared vision for wildlife governance. Simultaneously, actions such as collective mapping of customary territories and building networks with external stakeholders contribute to the formal recognition of Indigenous rights and authority beyond the local level.

These outputs are supported by efforts to build institutional capacity and improve access to relevant information, which together enable the establishment of essential governance mechanisms (e.g., locally legitimized rules, conflict resolution mechanisms, equitable benefit-sharing arrangements, sanctions for non-compliance, and participatory monitoring systems). The co-development of culturally relevant indicators grounded in

traditional and local ecological knowledge, plays a central role in producing information that supports adaptive management. Improving communication systems ensures that this information is accessible, promoting transparency and accountability.

DISCUSSION

This study contributes to the growing body of research on community-based wildlife management (CBWM) by proposing a theoretical model of place-based stewardship that builds on the care-knowledge-agency framework developed by Enqvist et al. (2018), emphasizing virtue as the expression of personal agency and place as the foundational interconnected system between people, wildlife, and space. Although place-based care provides motivation, it does not always lead to action (Chapin and Knapp 2015, Shephard et al. 2023b). Bridging this gap requires both institutional agency and virtue, understood as the internalized disposition to act for the social and ecological common good. Virtue is cultivated through intergenerational learning and embodied practice and grounded in traditional knowledge and skills. By placing place at the foundation, our model shows how care, knowledge, and agency interact in a virtuous cycle to support long-term, culturally grounded stewardship.

The application of our model is illustrated through two case studies of the Wapichan in Guyana and the Turumbu in the Democratic Republic of Congo (DRC), each offering insights into how Indigenous and local communities cultivate and express care, virtue, and agency in relation to wildlife. In the Wapichan case, enabling actions aimed at strengthening internal governance systems for place-based wildlife stewardship have also contributed to the external legitimization of their agency by higher-level institutions. In contrast, the Turumbu case illustrates that when external disturbances significantly impact the local environment and traditional ecological knowledge erodes, the essential elements for effective wildlife stewardship are diminished. In such contexts, interventions focused solely on improving governance will likely fail unless they are complemented by enabling actions that reinforce both care and virtue. Notably, the establishment of "Zamba clubs" as a community of practice for youth demonstrates how targeted interventions can begin to rebuild place-based virtue and care, particularly in a post-conflict context.

These examples illustrate the value of contextualized and culturally grounded interventions, affirming that community-based wildlife management initiatives must address not only ecological outcomes but also the social, cultural, and political dynamics that shape them (Zhang et al. 2023). As appointed by Schreckenberg et al. (2016) and Dawson et al. (2023), prioritizing conservation governance that is genuinely led by local communities and rooted in cultural context goes beyond the procedural standards often promoted in conservation policies, such as vague commitments to "full and effective participation" or superficial recognition of "traditional knowledge."

In response, our theory of change, developed from the conceptual model and informed by the Wapichan and Turumbu case studies, offers a practical planning and evaluation tool for wildlife practitioners. It identifies concrete enabling actions, outputs, and outcomes that together support the emergence of place-based care, knowledge, and agency, virtuously becoming the foundational elements for achieving place-based stewardship, understood as the inseparable well-being of humans, wildlife, and ecosystems.

The framework is particularly relevant in post-colonial and contested governance contexts, where Indigenous and local community rights and institutions often lack full recognition by higher level institutions. As Ojha et al. (2016) have noted, the concept of community must be "delocalized" to acknowledge the multilevel networks and external forces that shape local governance. Our model acknowledges these external influences but re-centers the analysis on the intrinsic motivations and behaviors for stewardship action grounded in a specific place. In doing so, it affirms the wider role of wildlife stewardship as a strategy for asserting jurisdiction, preserving knowledge, and reconfiguring power relations. This aligns with the insights of Reed et al. (2021), who describe how Indigenous guardians are balancing dual and conflicting roles with nations through community-based initiatives, and at the same time are using those opportunities to advance their rights with or without state recognition.

Furthermore, our work responds to recent critiques that stewardship remains conceptually rich but practically underdeveloped. McLeod et al. (2024) found that few studies detail the behavior-change tools used in stewardship or assess their design and effectiveness. Our theory of change seeks to fill this gap by offering a structured yet adaptable model for guiding intervention design and monitoring, grounded in both scientific and Indigenous knowledge systems. It also supports calls for integrating stewardship frameworks into policy sectors beyond conservation. For example, Nikolakis et al. (2023) and Mackean et al. (2022) show that Indigenous-led stewardship initiatives in Australia have not only ecological benefits but also produce cost-effective health outcomes, highlighting the cross-sectoral relevance of culturally appropriate management approaches.

Finally, our findings contribute to the growing recognition that effective wildlife governance must be grounded in diverse forms of knowledge. This study integrates insights from stewardship literature, Indigenous studies, and community-based wildlife management, while also being anchored in empirical evidence from Indigenous and local communities in Guyana and the DRC. As Kadykalo et al. (2021) argue, wildlife management decisions are too often shaped by past experience or subjective judgment, with insufficient integration of knowledge systems. In particular, Indigenous and local knowledge is frequently underutilized relative to Western scientific approaches, despite its enduring relevance for sustainable resource uses. Our conceptual model and theory of change respond to this gap by placing traditional ecological knowledge and local practices at the foundation of stewardship, while also highlighting how these knowledge systems interact with care, virtue, and agency. This approach not only enhances ecological effectiveness but also strengthens the legitimacy and cultural relevance of wildlife governance.

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Data Availability:

Data/code sharing is not applicable to this article because no data and code were analyzed in this study.

LITERATURE CITED

Albrecht, G., G. M. Sartore, L. Connor, N. Higginbotham, S. Freeman, B. Kelly, H. Stain, A. Tonna, and G. Pollard. 2007. Solastalgia: the distress caused by environmental change. Australasian Psychiatry 15(1):S95-S98. https://doi.org/10.1080/10398560701701288

Baco N. M., G. Biaou, F. Pinton, and J. P. Lescure. 2007. Les savoirs traditionnels conservent-ils encore l'agrobiodiversité au Bénin? Biotechnology, Agronomy, Society and Environment 11 (3): 201-210.

Baker, V. 2014. Mapped out: Guyana's indigenous mapmakers. Index on Censorship 43(2): 97-101. https://doi.org/10.1177/0306422014536104

Battory, J., and T. Vircoulon. 2020. Customary powers in the DRC: institutionalization, politicization and resilience. Institut français des relations internationales (IFRI), Centre Afrique subsaharienne, Paris, France.

Beckley, T. M. 2003. The relative importance of sociocultural and ecological factors in attachment to place. Pages 105-126 in L. Kruger, editor. Understanding community-forest relations. General Technical Report PNW-GTR-566. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon, USA. https://doi.org/10.2737/PNW-GTR-566

Begay, M. A., S. Cornell, M. Jorgensen, and N. Pryor. 2007. Rebuilding Native nations: what do leaders do. Pages 275-295 in M. Jorgensen, editor. Rebuilding native nations: strategies for governance and development. The University of Arizona Press, Tucson, Arizona, USA.

Bennett, N. J., M. Kaplan-Hallam, G. Augustine, N. Ban, D. Belhabib, I. Brueckner-Irwin, A. Charles, J. Couture, S. Eger, L. Fanning, et al. 2018. Coastal and Indigenous community access to marine resources and the ocean: a policy imperative for Canada. Marine Policy 87:186-193. https://doi.org/10.1016/j.marpol.2017.10.023

Berkes, F. 2009. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. Journal of Environmental Management 90(5):1692-1702. https://doi.org/10.1016/j.jenvman.2008.12.001

Berkes, F., J. Colding, and C. Folke. 2000. Rediscovery of traditional ecological knowledge as adaptive management. Ecological Applications 10(5):1251-1262. https://doi.org/10.1890/1051-0761(2000)010[1251:ROTEKA]2.0.CO;2

Bhushan, S., I. Dincă, and S. Shikha. 2024. Evaluating local livelihoods, sustainable forest management, and the potential for ecotourism development in Kaimur Wildlife Sanctuary, India. Frontiers in Forests and Global Change 7:1491917. https://doi.org/10.3389/ffgc.2024.1491917

Billiot, S., R. Beltrán, D. Brown, F.M. Mitchell, and A. Fernandez. 2022. Indigenous perspectives for strengthening social responses to global environmental changes: a response to the social work grand challenge on environmental change. Pages 96-116 in K. Rambaree, M. C. F. Powers, and R. J. Smith, editors. Ecosocial work in community practice. Routledge, London, UK. https://doi.org/10.4324/9781003347392-9

Bourke, S., A. Wright, J. Guthrie, L. Russell, T. Dunbar, and R. Lovett. 2018. Evidence review of Indigenous culture for health and wellbeing. The International Journal of Health, Wellness and Society 8(4):11-27. https://doi.org/10.18848/2156-8960/CGP/v08i04/11-27

Bramston, P., G. Pretty, and C. Zammit. 2011. Assessing environmental stewardship motivation. Environment and Behavior 43(6):776-788. https://doi.org/10.1177/0013916510382875

Brown, R. K., A. Kaiser, and A. Daniels. 2010. Religion and the interracial/ethnic common good. Journal of Religion & Society 12:1-12.

Büscher, B., and W. Dressler. 2012. Commodity conservation: the restructuring of community conservation in South Africa and the Philippines. Geoforum 43(3):367-376. https://doi.org/10.1016/j.geoforum.2010.06.010

Campbell, L. M., and A. Vainio-Mattila. 2003. Participatory development and community-based conservation: opportunities missed for lessons learned? Human Ecology 31:417-437. https://doi.org/10.1023/A:1025071822388

Challender, D. W., M. t' Sas-Rolfes, S. Broad, and E. J. Milner-Gulland. 2025. A theory of change to improve conservation outcomes through CITES. Frontiers in Ecology and Evolution 13:1425267. https://doi.org/10.3389/fevo.2025.1425267

Chapin, III, F. S., S. R. Carpenter, G. P. Kofinas, C. Folke, N. Abel, W. C. Clark, P. Olsson, D. M. Stafford Smith, B. Walker, O. R. Young, F. Berkes, R. Biggs, J. M. Grove, R. L. Naylor, E. Pinkerton, W. Steffen, and F. J. Swanson. 2010. Ecosystem stewardship: sustainability strategies for a rapidly changing planet. Trends in Ecology and Evolution 25(4):241-249. https://doi.org/10.1016/j.tree.2009.10.008

Chapin, III, F. S., and C. N. Knapp. 2015. Sense of place: a process for identifying and negotiating potentially contested visions of sustainability. Environmental Science and Policy 53:38-46. https://doi.org/10.1016/j.envsci.2015.04.012

CIFOR-ICRAF, FAO, CIRAD, and WCS. 2024. Wapichan Wiizi Wildlife Management Plan. Food and Agriculture Organization, Rome, Italy. https://openknowledge.fao.org/items/89e59114-1cc2-43a5-88bc-aed59c566717

Conference of the Parties to the Convention on Biological Diversity (CBD). 2022. Decision adopted by the Conference of the Parties to the Convention on Biological Diversity 15/4 Kunming-Montreal Global Biodiversity Framework. Secretariat of the CBD, Montréal, Québec, Canada.

Cooke, S., E. Allison, T. Beard, R. Arlinghaus, A. H. Arthington, D. M. Bartley, I. G. Cowx, C. Fuentevilla, N. J. Leonard, K.

Lorenzen, et al. 2016. On the sustainability of inland fisheries: finding a future for the forgotten. Ambio 45(7):753-764. https://doi.org/10.1007/s13280-016-0787-4

Cooney, R., D. Roe, H. Dublin, F. Booker, and S. Watterson. 2018. Wild life, wild livelihoods: involving communities in sustainable wildlife management and combating the illegal wildlife trade. United Nations Environment Programme, Nairobi, Kenya.

Crosby, B. C., and J. M. Bryson. 2005. Leadership for the common good: tackling public problems in a shared-power world. John Wiley & Sons, San Francisco, California, USA.

Cubillo, B., J. McCartan, C. West, and J. Brimblecombe. 2020. A qualitative analysis of the accessibility and connection to traditional food for aboriginal chronic maintenance hemodialysis patients. Current Developments in Nutrition 4(4):nzaa036. https://doi.org/10.1093/cdn/nzaa036

Davenport, M. A., and D. H. Anderson. 2005. Getting from sense of place to place-based management: an interpretive investigation of place meanings and perceptions of landscape change. Society and Natural Resources 18(7):625-641. https://doi.org/10.1080/08941920590959613

David, B., P. Isaacs, A. Johnny, L. Johnson, M. Pugsley, C. Ramacindo, G. Winter, and Y. Winter. 2006. Customary use of biological resources and related traditional practices within Wapichan Territory in Guyana. Forest Peoples Programme, Moreton-in-Marsh, UK. https://www.forestpeoples.org/publications-resources/reports/article/wa-wiizi-wa-kaduzu-our-territory-our-custom-customary-use-of-biological-resources-and-related-traditional-practices-within-wapichan-territory-in-guyana-an-indigenous-case-study-guyana-10c-case-study/?utm_source=chatgpt.com

Dawson, N., W. D. Carvalho, J. S. Bezerra, F. Todeschini, M. Tabarelli, and K. Mustin. 2023. Protected areas and the neglected contribution of Indigenous Peoples and local communities: struggles for environmental justice in the Caatinga dry forest. People and Nature 5(6):1739-1755. https://doi.org/10.1002/pan3.10288

Decker, D. J., D. A. B. Raik, L. H. Carpenter, J. F. Organ, and T. M. Schusler. 2005. Collaboration for community-based wildlife management. Urban Ecosystems 8:227-236. https://doi.org/10.1007/s11252-005-3264-6

Dietz, T., E. Ostrom, and P. C. Stern. 2003. The struggle to govern the commons. Science 302(5652):1907-1912. https://doi.org/10.1126/science.1091015

Duncan, T., J. Villarreal-Rosas, J. Carwardine, S. T. Garnett and C. J. Robinson. 2018. How environmental governance regimes influence Indigenous engagement in conservation planning in Australia. PARKS 24(2):87-99.

Enqvist, J., S. West, V. A. Masterson, L. J. Haider, U. Svedin, and M. Tengö. 2018. Stewardship as a boundary object for sustainability research: linking care, knowledge and agency. Landscape and Urban Planning 179:17-37. https://doi.org/10.1016/j.landurbplan.2018.07.005

Fernández-Giménez, M. E., D. J. Augustine, L. M. Porensky, H. Wilmer, J. D. Derner, D. D. Briske, and M. Olsgard Stewart. 2019. Complexity fosters learning in collaborative adaptive management. Ecology and Society 24(2):29. https://doi.org/10.5751/ES-10963-240229

Food and Agriculture Organization (FAO). 2022. Customary norms and practices used to strengthen the sustainable use and management of wildlife resources in the Rupununi by Wapichan Communities. FAO, Rome, Italy. https://openknowledge.fao.org/server/api/core/bitstreams/df6be0a9-ce86-4912-ab78-9ead017da2cd/content

Food and Agriculture Organization (FAO). 2023. Sustainable wildlife management programme. Guyana Newsletter Issue 13 February to June 2023. http://wildlife.gov.gy/wp-content/uploads/2023/09/SWM-Newsletter-Issue-13.pdf

Forest Peoples Programme. 2012. Wapichan people in Guyana present territorial map and community proposals to save ancestral forests. Forest Peoples Programme, Moreton-in-Marsh, UK.

Galway, L. P., T. Beery, K. Jones-Casey, and K. Tasala. 2019. Mapping the solastalgia literature: a scoping review study. International Journal of Environmental Research and Public Health 16(15):2662. https://doi.org/10.3390/ijerph16152662

Gieryn, T. F. 2000. A space for place in sociology. Annual Review of Sociology 26(1):463-496. https://doi.org/10.1146/annurev.soc.26.1.463

Gomes, P, and H. Wilson. 2012. Thinking together for those coming behind us: an outline plan for the care of Wapichan Territory in Guyana. South Central and South Rupununi Districts Toshaos Councils. South Central and South Rupununi Districts Toshaos Councils, South Rupununi, Guyana. https://www.lifemosaic.net/images/uploads/Territories_of_Life/TOL_Resources/Plan_de_Vida/Thinking_Together_For_Those_Coming_Behind_Us.pdf

Gram-Hanssen, I. 2021. Individual and collective leadership for deliberate transformations: insights from Indigenous leadership. Leadership 17(5):519-541. https://doi.org/10.1177/1742715021996486

Grey, S., and R. Kuokkanen. 2020. Indigenous governance of cultural heritage: searching for alternatives to co-management. International Journal of Heritage Studies 26(10):919-941. https://doi.org/10.1080/13527258.2019.1703202

Hakimzumwami, E. 2000. Community wildlife management in Central Africa. A regional review. International Institute for Environment and Development, London, UK.

Henfrey, T. B. 2002. Ethnoecology, resource use, conservation and development in a Wapishana community in the South Rupununi, Guyana. University of Kent at Canterbury, Canterbury, UK.

Hickey, S. 2007. Conceptualising the politics of social protection in Africa. Brooks World Poverty Institute Working Paper No. 04, Manchester, UK. https://ssrn.com/abstract=1204542

Holmberg, J., and K. H. Robèrt. 2000. Backcasting—a framework for strategic planning. International Journal of Sustainable Development & World Ecology 7(4):291-308. https://doi.org/10.1080/13504500009470049

Ingold T. 2000. The perception of the environment: essays on livelihood, dwelling and skills. Routledge, London, UK. https://doi.org/10.4324/9781003196662

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). 2019. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo, editors. IPBES Secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.3831673

International Labor Organization (ILO). [date unknown]. Guide to writing SMART outputs. ILO, Geneva, Switzerland. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_mas/@hrd/documents/instructionalmaterial/wcms_393392.pdf

International Union for Conservation of Nature (IUCN). 2021. IUCN SSC guidelines on human-wildlife conflict and coexistence. IUCN, Gland, Switzerland. https://iucn.org/resources/publication/iucn-ssc-guidelines-human-wildlife-conflict-and-coexistence-first-edition

International Work Group for Indigenous Affairs (IWGIA). 2020. Indigenous World 2020: Guyana. IWGIA, Copenhagen, Denmark. https://iwgia.org/En/Guyana/3623-Iw-2020-Guyana.Html

Juhé-Beaulaton, D., and B. Roussel. 2003. May Vodun sacred spaces be considered as a natural patrimony? Pages 33-56 in T. Gardner and D. Moritz, editors. Creating and representing sacred spaces. Peust & Gutschmidt Verlag, Göttingen, Germany. https://shs.hal.science/halshs-00089322v1/document

Kadykalo, A. N., S. J. Cooke, and N. Young. 2021. The role of western-based scientific, Indigenous and local knowledge in wildlife management and conservation. People and Nature 3 (3):610-626. https://doi.org/10.1002/pan3.10194

Kamelamela, K. L., H. K. Springer, R. Ku'ulei Keakealani, M. U. Ching, T. Ticktin, R. D. Ohara, E. W. Parsons, E. D. Adkins, K. S. Francisco, and C. Giardina. 2022. *Kōkua aku, Kōkua mai*: an Indigenous consensus-driven and place-based approach to community led dryland restoration and stewardship. Forest Ecology and Management 506:119949. https://doi.org/10.1016/j.foreco.2021.119949

Kennedy, C. M., B. Fariss, J. R. Oakleaf, S. T. Garnett, A. Fernández-Llamazares, J. E. Fa, S. Baruch-Mordo, and J. Kiesecker. 2023. Indigenous Peoples' lands are threatened by industrial development; conversion risk assessment reveals need to support Indigenous stewardship. One Earth 6(8):1032-1049. https://doi.org/10.1016/j.oneear.2023.07.006

Kim, P. J. 2019. Social determinants of health inequities in Indigenous Canadians through a life course approach to colonialism and the residential school system. Health Equity 3 (1):378-381. https://doi.org/10.1089/heq.2019.0041

Koy, J. K., A. M. M. Ngonga, and D. A. Wardell. 2019. Moving beyond the illusion of participation in the governance of Yangambi Biosphere Reserve (Tshopo Province, Democratic Republic of Congo). Nature Conservation 33:33-54. https://doi.org/10.3897/natureconservation.33.30781

Larsen, S. C., and J. T. Johnson. 2017. Being together in place: Indigenous coexistence in a more than human world. University of Minnesota Press, Minneapolis, Minnesota, USA. https://doi.org/10.5749/minnesota/9781517902216.001.0001

Lew-Levy, S., R. Reckin, N. Lavi, J. Cristóbal-Azkarate, and K. Ellis-Davies. 2017. How do hunter-gatherer children learn subsistence skills? A meta-ethnographic review. Human Nature 28(4):367-394. https://doi.org/10.1007/s12110-017-9302-2

List, C. 2013. Hunting, fishing, and environmental virtue. Oregon State University, Corvallis, Oregon, USA.

Luzar, J. B., K. M. Silvius, H. Overman, S. T. Giery, J. M. Read, and J. M. Fragoso, 2011. Large-scale environmental monitoring by indigenous peoples. BioScience 61(10):771-781. https://doi.org/10.1525/bio.2011.61.10.7

MacDonald, K. 2018. Wapichan Wiizi: conservation politics in the Rupununi (Guyana). Pages 148-165 in S. Mollett and T. Kepe, editors. Land rights, biodiversity conservation and justice. Routledge, London, UK. https://doi.org/10.4324/9781315439488-9

Mackean, T., M. Shakespeare, and M. Fisher. 2022. Indigenous and non-Indigenous theories of wellbeing and their suitability for wellbeing policy. International Journal of Environmental Research and Public Health 19(18):11693. https://doi.org/10.3390/ijerph191811693

Magaloni, B., A. Díaz-Cayeros, and A. Ruiz. 2019. Public good provision and traditional governance in Indigenous communities in Oaxaca, Mexico. Comparative Political Studies 52 (12):1841-1880. https://doi.org/10.1177/0010414019857094

Masterson, V. A., J. P. Enqvist, R. C. Stedman, and M. Tengö. 2019. Sense of place in social-ecological systems: from theory to empirics. Sustainability Science 14(3):555-564. https://doi.org/10.1007/s11625-019-00695-8

Masterson, V. A., R. C. Stedman, J. Enqvist, M. Tengö, M. Giusti, D. Wahl, and U. Svedin. 2017. The contribution of sense of place to social-ecological systems research: a review and research agenda. Ecology and Society 22(1):49. https://doi.org/10.5751/ES-08872-220149

McGregor, D. 2009. Linking traditional knowledge and environmental practice in Ontario. Journal of Canadian Studies 43(3):69-100. https://doi.org/10.3138/jcs.43.3.69

McLeod, L. J., J. C. Kitson, Z. Dorner, N. A. Tassell-Matamua, P. Stahlmann-Brown, T. L. Milfont, and D. W. Hine. 2024. Environmental stewardship: a systematic scoping review. PLoS ONE 19(5):e0284255. https://doi.org/10.1371/journal.pone.0284255

Menzies, A. K., E. Bowles, D. McGregor, A. T. Ford, and J. N. Popp. 2024. Sharing Indigenous values, practices and priorities as guidance for transforming human-environment relationships. People and Nature 6(5):2109-2125. https://doi.org/10.1002/pan3.10707

Mpoyi, C. M., D. D. Kipute, C. K. Kaswera, L. K. Tshipinda, and A. M. Maindo. 2025. Socio-anthropology of traditional wildlife exploitation mechanisms among the Turumbu people, DRC: What are the challenges for biodiversity conservation? Environment, Development and Sustainability 27:15931-15949. https://doi.org/10.1007/s10668-024-04588-4

Nikolakis, W., V. Gay, and A. Nygaard. 2023. The 'environmental stewardship-health nexus' among Indigenous peoples: a global systematic literature review. Wellbeing, Space and Society 4:100121. https://doi.org/10.1016/j.wss.2022.100121

Nikolakis, W., and R. M. Ross. 2022. Rebuilding Yunesit'in fire (*Qwen*) stewardship: learnings from the land. Forestry Chronicle 98(1):36-43. https://doi.org/10.5558/tfc2022-001

Nowak, A. C. 2019. Livelihoods of households living near Yangambi Biosphere Reserve, Democratic Republic of Congo. CIFOR-ICRAF, Bogor, Indonesia.

Nyumu, J. K. 2024. Environmental education through Zamba Clubs in the Yangambi Landscape. Solutions for Wildlife, 1 October. https://www.solutionsforwildlife.org/resource/environmental-education-through-zamba-clubs-in-the-yangambi-landscape/

Ocheni, S., and B.C. Nwankwo. 2012. Analysis of colonialism and its impact in Africa. Cross-cultural communication. 8(3): 46-54.

Ohmagari, K., and F. Berkes. 1997. Transmission of indigenous knowledge and bush skills among the Western James Bay Cree women of subarctic Canada. Human Ecology 25:197-222. https://doi.org/10.1023/A:1021922105740

Ojha, H. R., R. Ford, R. J. Keenan, D. Race, D. Carias Vega, H. Baral, and P. Sapkota. 2016. Delocalizing communities: changing forms of community engagement in natural resources governance. World Development 87:274-290. https://doi.org/10.1016/j.worlddev.2016.06.017

Ostrom, E. 1990. Governing the commons: the evolution of institutions for collective action. Cambridge University Press, Cambridge, UK. https://doi.org/10.1017/CBO9780511807763

Pagdee, A., Y. Kim, and P. J. Daugherty. 2006. What makes community forest management successful: a meta-study from community forests throughout the world. Society & Natural Resources 19(1): 33-52. https://doi.org/10.1080/08941920500323260

Parsons, J., C. Gokey, and M. Thornton. 2013. Indicators of inputs, activities, outputs, outcomes and impacts in security and justice programming. Practice Product for the Conflict, Crime & Violence Results Initiative (CCVRI), Department for International Development (DFID), London, UK. https://assets.publishing.service.gov.uk/media/5a7eb9fae5274a2e87db1828/Indicators.pdf

Persoon, G. A., and D. M. E. van Est. 2003. Co-management of natural resources: the concept and aspects of implementation. Pages 1-24 in G. A. Persoon, D. M. E. van Est, and P. E. Sajise, editors. Co-management of natural resources in Asia: a comparative perspective. Nordic Institute of Asian Studies, Copenhagen, Denmark.

Pinkerton, E. 1999. Factors in overcoming barriers to implementing co-management in British Columbia salmon fisheries. Conservation Ecology 3(2):2. https://doi.org/10.5751/ES-00150-030202

Prinsen, G., and S. Nijhof. 2015. Between logframes and theory of change: reviewing debates and a practical experience. Development in Practice 25(2):234-246. https://doi.org/10.1080/09614524.2015.1003532

Reed, G., N. D. Brunet, S. Longboat, and D. C. Natcher. 2021. Indigenous guardians as an emerging approach to indigenous environmental governance. Conservation Biology 35(1):179-189. https://doi.org/10.1111/cobi.13532

Reo, N. J., K. P. Whyte, D. McGregor, M. A. Smith, and J. F. Jenkins. 2017. Factors that support Indigenous involvement in multi-actor environmental stewardship. AlterNative: An International Journal of Indigenous Peoples 13(2):58-68. https://doi.org/10.1177/1177180117701028

Rogoff, B. 2014. Learning by observing and pitching in to family and community endeavors: an orientation. Human Development 57(2-3):69-81. https://doi.org/10.1159/000356757

Ryfield, F., D. Cabana, J. Brannigan, and T. Crowe. 2019. Conceptualizing 'sense of place' in cultural ecosystem services: a framework for interdisciplinary research. Ecosystem Services 36:100907. https://doi.org/10.1016/j.ecoser.2019.100907

Sandler, R. L. 2013. Environmental virtue ethics. Pages 1665-1674 in International Encyclopedia of Ethics. Wiley-Blackwell, Hoboken, New Jersey, USA. https://doi.org/10.1002/9781444367072.wbiee090

Scheidel, A., A. Fernández-Llamazares, A. H. Bara, D. Del Bene, D. M. David-Chavez, E. Fanari, I. Garba, K. Hanaček, J. Liu, J. Martínez-Alier, G. Navas, V. Reyes-García, B. Roy, L. Temper, M. A. Thiri, D. Tran, M. Walter, and K. P. Whyte. 2023. Global impacts of extractive and industrial development projects on Indigenous Peoples' lifeways, lands, and rights. Science Advances 9:23. https://doi.org/10.1126/sciadv.ade9557

Schreckenberg, K., P. Franks, A. Martin, and B. Lang. 2016. Unpacking equity for protected area conservation. Parks 22:11-28. https://doi.org/10.2305/IUCN.CH.2016.PARKS-22-2KS.en

Shephard, S., C. J. List, and R. Arlinghaus. 2023b. Reviving the unique potential of recreational fishers as environmental stewards of aquatic ecosystems. Fish and Fisheries 24(2):339-351. https://doi.org/10.1111/faf.12723

Shephard, S., J. Muhindo, J. Nyumu, E. Mbangale, S. Nziavake, P. Cerutti, and N. van Vliet. 2023a. Uneven transmission of traditional knowledge and skills in a changing wildmeat system: Yangambi, Democratic Republic of Congo. Frontiers in Conservation Science 4:1278699. https://doi.org/10.3389/fcosc.2023.1278699

Shephard, S., E. von Essen, T. Gieser, C. J. List, and R. Arlinghaus. 2024. Recreational killing of wild animals can foster environmental stewardship. Nature Sustainability 7(8):956-963. https://doi.org/10.1038/s41893-024-01379-7

Sheppard, S. R. J., and M. Meitner. 2005. Using multi-criteria analysis and visualisation for sustainable forest management planning with stakeholder groups. Forest Ecology and Management 207(1-2):171-187. https://doi.org/10.1016/j.foreco.2004.10.032

Songorwa, A. N. 1999. Community-based wildlife management (CWM) in Tanzania: Are the communities interested? World Development 27(12):2061-2079. https://doi.org/10.1016/S0305-750X(99)00103-5

Songorwa, A. N., T. Buhrs, and K. F. D. Hughey. 2000. Community-based wildlife management in Africa: a critical assessment of the literature. Natural Resources Journal 40 (3):603-643.

South Rupununi District Council (SRDC). 2024. South Rupununi District Council's Shadow Report to the Human Rights Committee on Guyana Review. SRDC, Guyana.

Springer, J., J. Campese, and B. Nakangu. 2021. The natural resource governance framework. International Union for Conservation of Nature, Gland, Switzerland.

Stenseke, M. 2018. Connecting 'relational values' and relational landscape approaches. Current Opinion in Environmental Sustainability 35:82-88. https://doi.org/10.1016/j.cosust.2018.10.025

Throsby, D., and E. Petetskaya. 2016. Sustainability concepts in indigenous and non-indigenous cultures. International Journal of Cultural Property 23(2):119-140. https://doi.org/10.1017/S0940739116000084

Tong, X. 2022. An exploration of Elinor Ostrom's theory of self-governance-based on governing the commons: the evolution of institutions for collective action. SHS Web of Conferences 148:01003. https://doi.org/10.1051/shsconf/202214801003

Turnbull, J. W., E. L. Johnston, and G. F. Clark. 2020. LESI: A quantitative indicator to measure local environmental stewardship. MethodsX 7:101141. https://doi.org/10.1016/j.mex.2020.101141

Tynan, L. 2021. What is relationality? Indigenous knowledges, practices and responsibilities with kin. Cultural Geographies 28 (4):597-610. https://doi.org/10.1177/14744740211029287

United Nations Development Group (UNDG). 2011. Results-based management handbook: harmonizing RBM approaches and concepts for improved development results at country level. United Nations Development Group, New York, New York, USA.

van Vliet, N., N. Millar, A. Melville, O. David, and L. Ignacio. 2022. Participation in subsistence activities and maintenance of traditional skills among indigenous youth in the South Rupununi, Guyana. Ethnobiology and Conservation 11. https://doi.org/10.15451/ec2022-08-11.22-1-13

van Vliet, N., J. Muhindo, J. K. Nyumu, O. Mushagalusa, and R. Nasi. 2018. Mammal depletion processes as evidenced from spatially explicit and temporal local ecological knowledge. Tropical Conservation Science 11. https://doi.org/10.1177/1940082918799494

Van Vliet, N., J. Muhindo, J. K. Nyumu, and R. Nasi. 2019. From the forest to the dish: a comprehensive study of the wildmeat value chain in Yangambi, Democratic Republic of Congo. Frontiers in Ecology and Evolution 7:132. https://doi.org/10.3389/fevo.2019.00132

West, S., L. J. Haider, V. Masterson, J. P. Enqvist, U. Svedin, and M. Tengö. 2018. Stewardship, care and relational values. Current Opinion in Environmental Sustainability 35:30-38. https://doi.org/10.1016/j.cosust.2018.10.008

Windsor, J. E., and J. A. McVey. 2005. Annihilation of both place and sense of place: the experience of the Cheslatta T'En Canadian First Nation within the context of large-scale environmental projects. Geographical Journal 171(2):146-165. https://doi.org/10.1111/j.1475-4959.2005.00156.x

Winter, K. B., M. Blaich Vaughan, N. Kurashima, L. Wann, E. Cadiz, A. H. Kawelo, M. Cypher, L. Kaluhiwa, and H. K. Springer. 2023. Indigenous stewardship through novel approaches to collaborative management in Hawai'i. Ecology and Society 28(1):26. https://doi.org/10.5751/ES-13662-280126

Zhang, Y., P. West, L. Thakholi, K. Suryawanshi, M. Supuma, D. Straub, S. Sithole, S., R. Sharma, J. Schleicher, B. Ruli, D. Rodríguez-Rodríguez, M. B. Rasmussen, V. C. Ramenzoni, S. Qin, D. D. Pugley, R. Palfrey, J. Oldekop, E. O. Nuesiri, V. H. T Nguyen, N. Ndam, C. Mungai, S. Milne, M. B. Mabele, S. Lucitante, H. Lucitante, J. Liljeblad, W. A. Kiwango, A. Kik, N. Jones, M. Jhonson, C. Jarret, R. S. James, G. Holmes, L. N. Gibson, A. Ghoddousi, J. Geldmann, M. F. Gebara, T. Edwards, W. H. Dressler, L. R. Douglas, P. G. Dimitrakopoulos, V. Davidov, E. M. F. W. Compaoré-Sawadogo, Y. A. Collins, M. Cepek, P. Berne, D. Brockington, M. P. B Balinga, B. J. Austin, R. Astuti, C. Ampumuza, and F. K. Agyei. 2023. Governance and conservation effectiveness in protected areas and indigenous and locally managed areas. Annual Review of Environment and Resources 48(1):559-588. https://doi.org/10.1146/annurev-environ-112321-081348

Zyambo, P. 2018. What is limiting success of community-based approach to conservation of natural resources in Southern Africa? Journal of Ecology and Natural Resources 2(4):000139. https://doi.org/10.23880/JENR-16000139