

Review

The rights way forward: reconciling the right to food with biodiversity conservation

WINY VASQUEZ and TERRY SUNDERLAND

Abstract The current paradigm of biodiversity conservation, with its continued focus on the notion of pristine nature, has resulted in the separation of humans and nature at the expense of both biological and cultural-linguistic diversity. The continued annexation of land for the cause of conservation has resulted in the curtailment of both rights and access to local and diverse food sources for many rural communities. Indigenous Peoples and local communities are fundamental to conserving biodiversity through sustainable use of nature despite repeated attempts to dispossess them from their lands, cultures and knowledge. It has been this traditional and land-based knowledge that has contributed to the conservation of biodiversity whilst also supporting healthy, diverse and nutritious diets. If we are to achieve a more just and sustainable future, we need to continue to centre conservation initiatives around rights, access and equity whilst respecting a plurality of perspectives, worldviews and knowledge systems. Here we review alternative approaches that help reconcile the right to food with biodiversity conservation, such as biocultural rights, rights-based approaches and integrated land management schemes, with the aim of identifying optimal ways forward for conservation that break away from the dichotomous view that pits people against nature and instead embrace the importance of this symbiotic relationship.

Keywords Conservation, food security, human rights, Indigenous People and local communities, nutrition, right to food, rights-based approaches

Introduction

Amidst unprecedented species extinction, biodiversity loss, land degradation, deforestation, pollution and accelerating climate change, the need to conserve nature has become imperative. State and non-state actors along with activists and individual citizens from diverse disciplines and backgrounds have revived the calls to conserve

biodiversity for the good of the planet and society (Wilson, 2016). These calls to conserve, however, have for centuries been predicated on erroneous divisions of humans and nature (Fletcher et al., 2021) that have led to disastrous consequences for wildlands and people (West et al., 2006). This division of humans and nature has also negatively affected the forest-food nexus that has sustained healthy, diverse and nutritional diets for millennia (HLPE, 2017; Asprilla-Perea & Díaz-Puente, 2019). Additionally, this dichotomous view has fuelled internecine competition between conservation and rights and eroded the traditional knowledge, customs and agency of Indigenous Peoples and local communities despite mounting evidence of the integral role they play in creating, managing and co-existing in complex, biodiverse landscapes (Kabra, 2009, 2018; Buergin, 2015; Armstrong et al., 2021).

As protected areas have been established to conserve biodiversity, the ties between people and the lands that have sustained them for millennia have been severed, affecting the long-term food security and overall well-being of local communities. For example, c. 30% of people in tropical countries are highly dependent on nature to meet their basic livelihood needs (Fedele et al., 2021), making calls for the continual separation of nature and humans through strict protected area models all that more egregious. Statistics on global food security and nutrition indicate that 2.37 billion people are facing moderate or severe food insecurity (FAO et al., 2021). Probably exacerbated by the global Covid-19 pandemic, this rise in food insecurity is on an upward trajectory (FAO et al., 2021). Food insecurity can lead to malnutrition, which can have far-reaching and long-lasting consequences for the health, well-being and development of those affected (Popkin, 2001; Cawthorn & Hoffman, 2015; Nielsen et al., 2018; Savage et al., 2019). Although the drivers of food insecurity and malnutrition are complex and multiple, there is increasing evidence that forests and natural ecosystems support the food security and nutrition of rural communities in myriad ways (Ickowitz et al., 2016; HLPE, 2017; Galway et al., 2018).

The legacy of the impacts of fortress conservation on the right to food

The establishment of protected areas based on the so-called fortress conservation model, which sees people as a threat to the protection of nature, has led to several negative social impacts, as communities that relied previously on

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these landscapes have had to bear the consequences that come with the separation of people from the resources that sustain them economically, physically and spiritually (Brockington & Igoe, 2006; West et al., 2006). Large-scale displacement (both economic and physical) in the name of conservation has resulted in food insecurity as a loss of access has led to the breakdown of the many ways in which forests and other natural landscapes support food security and nutrition (HLPE, 2017; Sunderland & Vasquez, 2020). This breakdown of the link between people and nature has also weakened the forest–food nexus as we have narrowed our focus on monoculture agricultural production as the only means by which to ensure food security and nutrition for all (Fouilleux et al., 2017; Bahar et al., 2020). Furthermore, conservation policies that disregard the rights of Indigenous Peoples and local communities and impose restrictions on their livelihoods have been shown to lead to so-called double unsustainability in which both biodiversity conservation and human livelihoods are compromised (Anaya & Espírito-Santo, 2018).

Although there are many ways to conserve biodiversity, there has been a historical bias towards the establishment of protected areas as the most effective conservation strategy. The Half-Earth movement (Ellis & Mehrabi, 2019) and the 30 × 30 movement, which calls to protect 30% of the surface of the Earth by 2030 (NRDC, 2020), are two examples of contemporary conservation strategies that rely heavily on the protected area narrative, despite mounting evidence that the protected area model at its most stringent devalues the important role that Indigenous Peoples and local communities have played and continue to play in creating and maintaining healthy and diverse ecosystems (Büscher et al., 2017; Garnett et al., 2018; FAO & FILAC, 2021; Fletcher et al., 2021). A recent report on forest governance by Indigenous and tribal people highlighted the central role that such groups have played in biodiversity conservation, poverty reduction and improving food security and human health (FAO & FILAC, 2021). In one study cited

by the report, Indigenous territories in the Peruvian Amazon were found to be twice as effective at reducing deforestation compared to protected areas under similar ecological conditions (Schleicher et al., 2017; FAO & FILAC, 2021). Although these and other studies have shown that protected areas are not always the most effective means by which to conserve biodiversity, conservation still relies heavily on this ingrained paradigm. In an era when the fight for justice and equality has taken centre stage in a multitude of disciplines and contexts, the perspectives that inform conservation policies have remained narrowly focused and slow to change.

Forests, people and food

Achieving food security, defined as when ‘all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food which meets their dietary needs and food preferences for an active and healthy life’ (FAO et al., 2017, p. 107), remains a major challenge. However, for much of human history, forests and other natural landscapes have supported food security and nutrition by helping to sustain healthy and nutritious diets directly through the provisioning of wildfoods and indirectly through ecosystem services such as pollination, water regulation and soil stabilization (Fig. 1). Forests can also help bolster food security and nutrition by increasing dietary diversity (Roche et al., 2008; Galway et al., 2018; Kasimba et al., 2018; Baudron et al., 2019) and by acting as safety nets during hardships brought on by external factors such as agricultural loss, droughts and other economic and environmental shocks (Pouliot & Treue, 2013; Clements et al., 2014).

Another fundamental aspect of the forest–food nexus is the crucial role that Indigenous Peoples and local communities have played in the creation of these biodiverse, productive and nutritionally rich landscapes (Gorenflo et al., 2012; Armstrong et al., 2021). In the Pacific Northwest in



FIG. 1 Forests contribute to food security in both direct and indirect ways. The five main ways in which they do this are through ecosystem services, direct provisioning of wild foods, bioenergy, source of income, and health. Adapted from Vasquez & Sunderland (2021).

Canada, for example, forests have long been managed by Indigenous Peoples to create long-lasting forest gardens that have greater plant and functional trait diversity than non-managed forests (Armstrong et al., 2021). These findings contradict the dominant conservation narrative that depicts people as the antithesis to pristine nature and wilderness (Fletcher et al., 2021) and has been challenged by Indigenous Peoples globally (van der Merwe et al., 2016; Huambachano, 2019a,b). Western science has only recently begun to recognize what Indigenous Peoples have been proclaiming for decades: that they have been creating, managing and safeguarding high-biodiversity landscapes for millennia (FAO & FILAC, 2021; Fletcher et al., 2021). Indigenous governance over ancestral lands has long played a vital role in combating deforestation, poverty, hunger and malnutrition (FAO & FILAC, 2021) despite the continual oppression of Indigenous Peoples and local communities and their rights, knowledge systems and ways of knowing, which has been exacerbated by historical and ongoing colonial practices and land dispossession. A study of land dispossession and forced migration in the USA estimated that Indigenous People have experienced a 93.9% reduction of their historically documented lands, with 42% of tribes experiencing a complete loss of land (Farrell et al., 2021). Given that the identities of many Indigenous Peoples and local communities are inextricable from their lands, the impact this has had on their cultures, customs, knowledge systems, nutrition and overall well-being is substantial.

The connection between forests and food has also been challenged as diets have undergone changes under increasing industrialization and urbanization (Damman et al., 2008). Indigenous Peoples have been found to be at greater risk of developing non-communicable diseases such as diabetes and cardiovascular disease when they transition away from their traditionally diverse and nutritionally dense diets to Western diets that rely on a narrower range of foods that, despite being calorie-dense, are often highly processed and nutritionally poor (Kuhnlein et al., 2004; Damman et al., 2008; Lourenço et al., 2008). This nutrition transition and its adverse impacts on health have been documented in various countries, including Canada (Kenny et al., 2018; Farquhar, 2020), Sri Lanka (Weerasekara et al., 2018), Indonesia (Ickowitz et al., 2016) and Brazil (Lourenço et al., 2008).

Several recent studies have advocated for increased access to forests and other wildlands as a means to mitigate food insecurity in rural settings, and have highlighted the various mechanisms through which access to forests and natural resources can help not only increase food security but also supply individuals with more nutritious, diverse and culturally supporting diets than those available from agriculture and local markets alone (Rasolofoson et al., 2020; Sunderland & Vasquez, 2020). However, despite an

increased awareness of the interconnected relationships between forests, people and food, there remains a policy disconnect between increased calls for rights-based frameworks and approaches and forest and conservation policies (HLPE, 2017). There is a substantial lag between calls to action, legal frameworks, international agreements and changes on the ground (Tauli-Corpuz et al., 2020). Despite the diverse ways in which forests, people and food interact and sustain one another, these linkages remain underutilized in terms of conservation and food-related policies because of the siloed approaches to conservation, agriculture and broader economic development.

Although the forest–food link is becoming more recognized, the right to food is still contested inside protected areas, where conservation objectives can conflict with local livelihoods and, in certain instances, can lead to human rights violations (West et al., 2006). A recent example of this was the human rights abuse allegations levied against WWF by a 2019 Buzzfeed investigation and the subsequent hearing on 26 October 2021 by the US Subcommittee on Water, Oceans and Wildlife (Survival International, 2021). This unveiled how deeply rooted colonialist ideas of conservation have had far-reaching impacts on the rights, dignity and well-being of local communities. These types of human rights abuses in the name of biodiversity conservation will continue to affect the food security and nutrition of communities that live inside or in close proximity to protected areas.

The right to food

The right to food was first recognized as a universal human right under Article 25 of the 1948 Universal Declaration of Human Rights, which recognized the right to an adequate standard of living, including food (United Nations, 1948; Knuth & Vidar, 2011). The right to food was further affirmed in the legally binding 1966 International Covenant on Economic, Social and Cultural Rights, in which Article 11 guarantees the right to adequate food as well as the right to be free from hunger (FAO, 2019). Although the right to food is legally binding for states that have ratified the relevant treaties, some states have taken a further step by incorporating the right to food into their constitutions or setting out other national legal frameworks that uphold this right (Knuth & Vidar, 2011). Countries that have written the right to food into their constitutions include Bolivia, Brazil, Ecuador, South Africa and Mexico (Knuth & Vidar, 2011).

As with all human rights, the right to food is universal, indivisible, interdependent, inalienable and interrelated, and it is supported by well-defined frameworks that set out the obligations of states to respect, protect and fulfil this right (Mechlem, 2004; FAO, 2019). When implemented as intended, this also gives individuals a platform in which

they can hold states and agencies accountable for any violations of rights (Mechlem, 2004; Witter & Satterfield, 2019). The right to food and rights-based approaches, unlike the policy objective of food security, are better suited to addressing hunger and malnutrition because of their ‘basis on human dignity, [their] explicit acknowledgement of existing human rights standards, [their] transparency, accountability, and empowerment dimension, particularly through participation, non-discrimination, and attention to vulnerable groups’ (Mechlem, 2004, p. 646). Because of this, rights-based approaches to food security and nutrition are better suited to combatting hunger and malnutrition in the context of biodiversity conservation as they acknowledge and respect the a priori rights of Indigenous Peoples and local communities. These approaches are also more in line with calls for decolonizing conservation in favour of more expansive and holistic visions based on a plurality of perspectives that value and prioritize local ways of knowing, using, interacting and living with nature (Stanton, 2014; Buergin, 2015; Fletcher et al., 2021; Guirunet et al., 2021; Kashwan et al., 2021).

One mechanism that has been proposed for integrating rights into conservation policies and practices is the idea of joining together the rights of nature and human rights through the recognition and implementation of biocultural rights (Bavikatte, 2011; Chen & Gilmore, 2015). These are seen as group rights that aim to protect both the natural and cultural resources of Indigenous People as well the environment and resources they steward (Chen & Gilmore, 2015; Sajeva, 2015). This conceptualization of grouping the rights of nature and people could be more congruent with the holistic worldview of Indigenous communities with respect to people and nature (MacPherson et al., 2020). Although biocultural rights are still being delineated, conceptualized and, in some cases, legalized, there remain challenges with regards to their meaning and subsequent implications for who is classified as a rights-holder and duty-bearer (Sajeva, 2015). Although biocultural rights represent a relatively new concept, with substantive barriers to implementation, they are an example of how governance structures and Western legal systems can be re-envisioned to align better with local ways of knowing and being.

Another means by which to achieve transformative change and environmental justice is to pay more attention to understanding the value systems of local communities, as these value systems underpin how people view and interact with their land (Guirunet et al., 2021). If the local value system is not recognized and understood adequately, we run the risk of carrying on with harmful conservation practices that continue to impose outside perspectives and priorities and dismiss the wealth of knowledge and agency of local communities (Rudd et al., 2021). Indigenous and local people who carry generations of place-based knowledge and practices are often best suited to

conceptualizing and formulating new conservation strategies that could be more effective and sustainable over time (Bray & Velázquez, 2009), whilst not engendering Indigenous and local communities with romanticized ideas of the so-called noble savage (Nikolakis & Hotte, 2021). An epistemological transformation has also been argued for, in which experiential knowledge is considered equal to scientific knowledge (Guirunet et al., 2021). This is a bold idea in a world where the superiority of scientific knowledge is enshrined in academia. Similarly, an ethical space has been referred to as a means to balance asymmetrical power and engage diverse worldviews in Indigenous-conservation partnerships (Nikolakis & Hotte, 2021). The Mi’kmaw principle of Two-Eyed Seeing, as described by Elder Albert Marshall, is a way to embrace equitably both Indigenous and Western knowledge systems for the benefit of all (Bartlett et al., 2012). These developing ideas could become a means of advocating for rights-based approaches by recognizing and respecting the rights of Indigenous Peoples and local communities to use and protect their own knowledge systems.

Looking more broadly at rights-based legal frameworks that have been adopted successfully, in 2019 the provincial government of British Columbia, Canada, introduced and subsequently passed Bill 41, The Declaration on the Rights of Indigenous Peoples Act (Chan, 2019). This new Bill marked a historical moment: British Columbia has become one of the first jurisdictions in the world to implement the United Nations Declaration on the Rights of Indigenous People (Chan, 2019). Under this new Bill, British Columbia has an obligation to align all existing laws with the United Nations Declaration on the Rights of Indigenous People; this will be an important step towards reconciliation (Chan, 2019). Although progress on the alignment of British Columbia laws with the United Nations Declaration on the Rights of Indigenous People will be slow and uneven in the first few years of its implementation, this new Bill demonstrates that it is possible to acknowledge, respect and integrate Indigenous rights into legal frameworks. It will also increase accountability and transparency and foster robust and reciprocal relationships with Indigenous People (Chan, 2019). Although Bill 41 is not focused specifically on the right to food, it can serve as an example of how to implement wider rights-based approaches to land management. Tracking the progress of this new Bill will be a useful means for understanding how to implement similar frameworks elsewhere.

Although rights-based approaches hold considerable promise for bringing about transformative change in the conservation arena, they are not without controversy, ambiguity and inherent tension (Campese et al., 2009). Although rights are, in theory, discrete and well-defined entities (Mechlem, 2004), there are still instances in which they are being redefined, contextualized and acted upon in

contrasting ways. A review of non-academic publications on rights integration found that conservation organizations were defining and operationalizing rights in ways that best suited their own agendas and were not necessarily in line with the legal rights of Indigenous Peoples and local communities (Witter & Satterfield, 2019). This represents an important gap between how rights are framed and expressed in international laws and how they are realized and expressed by conservation organizations and governmental and non-governmental bodies. Therefore, confusion sometimes remains regarding who is classified as a duty-bearer and who is classified as a rights-holder, which can obfuscate responsibilities and accountability, particularly when it comes to the role of non-state actors such as international conservation organizations and donor agencies (Kashwan, 2013; Buergin, 2015; Witter & Satterfield, 2019). Some scholars are also concerned that formalizing rights as they are understood currently in the Western legal system could undermine customary rights (Corson et al., 2020). Attention therefore needs to be paid to how and for whom rights-based approaches to food security, nutrition and conservation are implemented.

Three fundamental questions to consider as we look at integrating rights-based approaches and the right to food into conservation policies and instruments are: (1) What values and assumptions are embedded in our knowledge systems and ways of thinking that then go on to guide conservation initiatives, management, implementation and monitoring? (2) How are power asymmetries determining what knowledge is being privileged and acted upon? (3) How can we build upon existing practices and knowledge systems rather than importing knowledge systems from the outside in ways that are not contextualized to or respectful of the customary practices, epistemologies or ontologies already present in these landscapes?

Integrated landscape management and food security and nutrition

Despite the many challenges of realizing the right to food within biodiversity conservation, integrated landscape management has the potential to resolve these issues because of its holistic, multi-systems approach to reconciling seemingly competing interests such as social welfare, conservation, sustainability and economic development (Sayer et al., 2013). Although integrated land management has evolved over time and encompasses a wide array of frameworks, such approaches have been gaining ground as potential means to address global challenges such as poverty, food insecurity, climate change and biodiversity loss (Reed et al., 2016). Landscape approaches seek to integrate policy and practice for competing land uses whilst acknowledging the inevitable trade-offs that will occur amongst stakeholders. This renders such approaches well-positioned to also tackle the issues

surrounding the right to food in the context of biodiversity conservation (Reed et al., 2020b). The iterative and collaborative nature of landscape approaches will also be an important factor in the adaptability of such frameworks across a wide range of contexts, although challenges remain regarding the incorporation of local knowledge in these approaches (Reed et al., 2020a). Although landscape approaches will not provide a single solution that is applicable in all cases, such initiatives could help to identify entry points and potential synergies for policy development regarding the right to food in biodiversity conservation.

In common with landscape approaches, nutrition-sensitive agriculture or nutrition-sensitive landscapes are other integrated landscape management frameworks that have achieved some success in increasing the focus on nutrition through a holistic approach that concentrates on more than food production and calories alone (Jaenicke & Virchow, 2013; Alders & Kock, 2018). Nutrition-sensitive agriculture, for example, seeks to optimize the production and consumption of micronutrient-rich food by regarding the food system and the landscape as a single integrated entity (Jaenicke & Virchow, 2013; Timler et al., 2020). From a social and economic standpoint, nutrition-sensitive landscapes can also help contribute to the economy as better-nourished people will be more able to contribute to the development of their communities (Frison et al., 2006; Padulosi et al., 2019). In Tanzania, one nutrition-sensitive agroecological intervention increased the dietary diversity of children as well as household food security whilst also leading to improvements in sustainable agriculture and the overall empowerment and well-being of women (Santoso et al., 2021). This holistic, landscape-scale approach to nutrition could be an entry point into promoting the right to food within conservation and lead ultimately to nutrition-sensitive conservation schemes. It has been argued that forest conservation can act as an appropriate nutrition-sensitive intervention: one study found that exposure to forests significantly reduced child stunting, which is a severe form of malnutrition (Rasolofoson et al., 2020). This finding affirms the link between forests, people, food security, nutrition and health and further supports the need for nutrition-sensitive conservation schemes that take a systems approach to food security and nutrition, conservation, sustainability and well-being. Aside from increasing nutrition and dietary diversity, forest conservation is also important for human health as deforestation has been linked to increased incidences of vector-borne and zoonotic diseases (Morand & Lajaunie, 2021) and is likely to lead to greater numbers of pandemics (FAO et al., 2020). The One Health Approach, which recognizes the interconnectedness of animal, human and ecosystem health, is therefore another important approach to consider when thinking of the future of conservation and the right to food (Global Landscapes Forum & Youth in Landscape Initiative, 2021).

Moving forward

Mounting evidence of the negative impacts of protected areas on livelihoods and, by extension, on food security and nutrition, has highlighted the need for new conservation strategies that recognize the rights of Indigenous Peoples and local communities as actors with knowledge and agency (Artelle et al., 2019; Kashwan et al., 2021). Biodiversity conservation based on a dichotomous understanding of nature can no longer stand amidst mounting evidence of the interconnectedness of people, nature and land. There also needs to be a concerted effort by the conservation community to diversify conservation strategies to adequately reflect the diversity of knowledge and practices that are already being carried out by Indigenous Peoples and local communities in these landscapes. Protected areas have long been the cornerstone of biodiversity conservation but this approach has typically not considered people. In contrast, Indigenous Peoples and local communities have, through generational and relational knowledge systems, understood and based their interactions with nature on a holistic perspective that lends itself well to harmonious human–nature relationships (Guibrunet et al., 2021). Conservation policies based on rights can therefore help to support the human–nature relationships that are integral to healthy and biodiverse landscapes.

The traditional knowledge of Indigenous Peoples and local communities has often been overlooked, dismissed, misunderstood and underappreciated in conservation science in favour of Western knowledge systems and policies (Kashwan et al., 2021; Rudd et al., 2021). Adherence to a Western perspective has facilitated the disappearance of cultural-linguistic diversity, yet the latter is often correlated with high levels of biological diversity (Gorenflo et al., 2012; Frainer et al., 2020). This has resulted in asymmetrical power structures that reinforce the status quo by deciding which knowledge systems and practices are considered legitimate and worthy of integration into conservation policies (López-Cubillos et al., 2021). Although rights-based approaches alone will not correct power imbalances, they can help to set frameworks by which rights violations and discrimination can be addressed.

In New Zealand, where 25% of children experience food insecurity and the prevalence of obesity is greater amongst Indigenous than non-Indigenous children, a rights- and place-based approach investigated policy options that would safeguard the right to healthy food for tamariki Māori children (McKerchar et al., 2021). This study concluded that it would be necessary to mount a comprehensive policy response to secure the right to food, as food insecurity is an expression of a myriad of factors that cannot be addressed simply by increasing food production. It also reflected upon the historical context and structural barriers that have led to present-day

health disparities in the community (McKerchar et al., 2021). Relying on the voices of both Māori and non-Māori participants illustrated how localized knowledge and experiences can be utilized to guide responses and policies by contextualizing the right to food to reflect the local realities. This case study outlines one approach that can be taken to formulate better place-based conservation strategies that are cognizant of the knowledge, priorities and desires of Indigenous Peoples and local communities. Therefore, similar conservation interventions that uphold the rights of Indigenous Peoples and local communities to define their own knowledge systems, cultures and practices can also help to ensure the right to food by supporting and enforcing already-existing customs that are rights- and place-based, and sustainable over time.

Conclusion

Implementing conservation models that are more equitable, inclusive and just will only be possible if we acknowledge the rights and agency of Indigenous Peoples and local communities to their traditional lands as well as their accompanying value systems, traditional knowledge and ways of knowing and being. Place-based conservation schemes that uphold the universal, inalienable and indivisible rights of Indigenous Peoples and local communities to their lands, cultures and traditions will help break away from the historically siloed approach to conservation and other land uses and help foster self-sustaining practices that support both conservation and food security and nutrition. Although many barriers remain to the implementation of conservation strategies that respect and support the right to food, examples of how to do this are growing. These examples vary from Indigenous-led conservation strategies based on place-based knowledge and worldviews, to the establishment of new legal frameworks that seek to build synergies between nature and people. Integrated land management frameworks such as integrated landscape approaches and nutrition-sensitive landscapes as well as the One Health Approach will also be important when it comes to reconciling biodiversity conservation and the right to food. Although the formal operationalization of landscape approaches is still in its infancy, this framework holds considerable promise because of its holistic, adaptive and iterative nature. In addition, the management and implementation of nutrition-sensitive landscapes and biodiversity conservation can be combined to create nutrition-sensitive conservation schemes that strengthen the forest–food nexus and lead to healthy, diverse and nutritious diets as well as the conservation of biodiversity.

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References

- ALDERS, R. & KOCK, R. (2018) What's food and nutrition security got to do with wildlife conservation? *Australian Zoologist*, 39, 120–126.
- ANAYA, F.C. & ESPIRITO-SANTO, M.M. (2018) Protected areas and territorial exclusion of traditional communities: analyzing the social impacts of environmental compensation strategies in Brazil. *Ecology and Society*, 23, 8.
- ARMSTRONG, C.G., MILLER, J.E.D., MCALVAY, A.C., RITCHIE, P.M. & LEPOFSKY, D. (2021) Historical indigenous land-use explains plant functional trait diversity. *Ecology and Society*, 26, 6.
- ARTELLE, K.A., ZURBA, M., BHATTACHARRYA, J., CHAN, D.E., BROWN, K., HOUSTY, J. & MOOLA, F. (2019) Supporting resurgent indigenous-led governance: a nascent mechanism for just and effective conservation. *Biological Conservation*, 240, 108284.
- ASPRILLA-PEREIRA, J. & DÍAZ-PUENTE, J.M. (2019) Importance of wild foods to household food security in tropical forest areas. *Food Security*, 11, 15–22.
- BAHAR, N.H.A., LO, M., SANJAYA, M., VAN VIANEN, J., ALEXANDER, P., IKOWITZ, A. & SUNDERLAND, T. (2020) Meeting the food security challenge for nine billion people in 2050: what impact on forests? *Global Environmental Change*, 62, 102056.
- BARTLETT, C., MARSHALL, M. & MARSHALL, A. (2012) Two-eyed seeing and other lessons learned within a co-learning journey of bringing together indigenous and mainstream knowledges and ways of knowing. *Journal of Environmental Studies and Sciences*, 2, 331–340.
- BAUDRON, F., TOMSCHA, S.A., POWELL, B., GROOT, J.C.J., GERGEL, S.E. & SUNDERLAND, T. (2019) Testing the various pathways linking forest cover to dietary diversity in tropical landscapes. *Frontiers in Sustainable Food Systems*, 3, 97.
- BAVIKATTE, S. (2011) *Stewarding the Earth: rethinking property and the emergence of biocultural rights*. PhD thesis. University of Cape Town, Cape Town, South Africa.
- BRAY, D.B. & VELÁZQUEZ, A. (2009) From displacement-based conservation to place-based conservation. *Conservation and Society*, 7, 11–14.
- BROCKINGTON, D. & IGOE, J. (2006) Eviction for conservation: a global overview. *Conservation and Society*, 4, 424–470.
- BUERGIN, R. (2015) Contested rights of local communities and indigenous peoples in conflicts over biocultural diversity: the case of Karen communities in Thung Yai, a world heritage site in Thailand. *Modern Asian Studies*, 49, 2022–2062.
- BÜSCHER, B., FLETCHER, R., BROCKINGTON, D., SANDBROOK, C., ADAMS, W.M., CAMPBELL, L., et al. (2017) Half-Earth or Whole Earth? Radical ideas for conservation, and their implications. *Oryx*, 51, 407–410.
- CAMPÈSE, J., SUNDERLAND, T., GREIBER, T. & OVIEDO, G. (eds) (2009) *Rights-Based Approaches: Exploring Issues and Opportunities for Conservation*. CIFOR, Bogor, Indonesia and IUCN, Gland, Switzerland.
- CAWTHORN, D.M. & HOFFMAN, L.C. (2015) The bushmeat and food security nexus: a global account of the contributions, conundrums and ethical collisions. *Food Research International*, 76, 906–925.
- CHAN, E. (2019) *New BC Legislation Now in Force to Implement Declaration on the Rights of Indigenous Peoples Act*. Norton Rose Fulbright. nortonrosefulbright.com/en-ca/knowledge/publications/32ff0686/new-bc-legislation-now-in-force-to-implement-declaration-on-the-rights-of-indigenous-peoples-act [accessed 20 November 2021].
- CHEN, C.W. & GILMORE, M. (2015) Biocultural rights: a new paradigm for protecting natural and cultural resources of indigenous communities. *International Indigenous Policy Journal*, 6, 1–17.
- CLEMENTS, T., SUON, S., WILKIE, D.S. & MILNER-GULLAND, E.J. (2014) Impacts of protected areas on local livelihoods in Cambodia. *World Development*, 64, S125–S134.
- CORSON, C., FLORES-GANLEY, I., WORCESTER, J. & ROGERS, S. (2020) From paper to practice? Assembling a rights-based conservation approach. *Journal of Political Ecology*, 27, 1–20.
- DAMMAN, S., EIDE, W.B. & KUHNLEIN, H.V. (2008) Indigenous peoples' nutrition transition in a right to food perspective. *Food Policy*, 33, 135–155.
- ELLIS, E.C. & MEHRABI, Z. (2019) Half Earth: promises, pitfalls, and prospects of dedicating half of Earth's land to conservation. *Current Opinion in Environmental Sustainability*, 38, 22–30.
- FAO (2019) *Fifteen Years Implementing the Right to Food Guidelines – Reviewing Progress to Achieve the 2030 Agenda*. FAO, Rome, Italy.
- FAO & FILAC (2021) *Forest Governance by Indigenous and Tribal Peoples. An Opportunity for Climate Action in Latin America and The Caribbean*. FAO and FILAC, Santiago, Chile. fao.org/3/cb293oen/cb293oen.pdf [accessed January 2023].
- FAO, CIRAD, CIFOR & WCS (2020) *White Paper: Build Back Better in a Post COVID-19 World – Reducing Future Wildlife-Borne Spillover of Disease to Humans*. Sustainable Wildlife Management (SWM) Programme, Rome, Italy. doi.org/10.4060/cb1503en.
- FAO, IFAD, UNICEF, WFP & WHO (2017) *The State of Food Security and Nutrition in the World 2017. Building Resilience for Peace and Food Security*. FAO, Rome, Italy. unicef.org/media/49031/file/State_of_Food_Security_and_Nutrition_in_the_World_2017-ENG.pdf [accessed January 2023].
- FAO, IFAD, WFP & WHO (2021) *The State of Food Security and Nutrition in the World 2021. Transforming Food Systems for Food Security, Improved Nutrition and Affordable Healthy Diets for All*. FAO, Rome, Italy. doi.org/10.4060/cb4474en.
- FARQUHAR, S.D. (2020) Inuit seal hunting in Canada: emerging narratives in an old controversy. *Arctic*, 73, 13–19.
- FARRELL, A.J., MCCONNELL, K., BUROW, P.B., BAYHAM, J. & WHYTE, K. (2021) Effects of land dispossession and forced migration on Indigenous peoples in North America. *Science*, 374, 4943.
- FEDELE, G., DONATTI, C.I., BORNACELLY, I. & HOLE, D.G. (2021) Nature-dependent people: mapping human direct use of nature for basic needs across the tropics. *Global Environmental Change*, 71, 102368.
- FLETCHER, M.-S., HAMILTON, R., DRESSLER, W. & PALMER, L. (2021) Indigenous knowledge and the shackles of wilderness. *Proceedings of the National Academy of Sciences of the United States of America*, 118, e2022218118.
- FOUILLEUX, E., BRICAS, N. & ALPHA, A. (2017) 'Feeding 9 billion people': global food security debates and the productionist trap. *Journal of European Public Policy*, 24, 1658–1677.
- FRAINER, A., MUSTONEN, T., HUGU, S., ANDREEVA, T., ARTTIJEFF, E.M., ARTTIJEFF, I.S. et al. (2020) Opinion: cultural and linguistic diversities are underappreciated pillars of biodiversity. *Proceedings of the National Academy of Sciences of the United States of America*, 117, 26539–26543.
- FRISON, E.A., SMITH, I.F., JOHNS, T., CHERFAS, J. & EYZAGUIRRE, P.B. (2006) Agricultural biodiversity, nutrition, and health: making a difference to hunger and nutrition in the developing world. *Food and Nutrition Bulletin*, 27, 167–179.
- GALWAY, L.P., ACHARYA, Y. & JONES, A.D. (2018) Deforestation and child diet diversity: a geospatial analysis of 15 sub-Saharan African Countries. *Health and Place*, 51, 78–88.

- GARNETT, S.T., BURGESS, N.D., FA, J.E., FERNÁNDEZ-LLAMAZARES, Á., MOLNÁR, Z., ROBINSON, C.J. et al. (2018) A spatial overview of the global importance of Indigenous lands for conservation. *Nature Sustainability*, 1, 369–374.
- GLOBAL LANDSCAPES FORUM & YOUTH IN LANDSCAPE INITIATIVE (2021) *One World, One Health: Recommendations to Harness the Power of Landscapes*. Global Landscape Forum, Bonn, Germany. globallandscapesforum.org/wp-content/uploads/2021/01/GLF_Biodiversity_Policy_report.pdf [accessed January 2023].
- GORENFLO, L.J., ROMAINE, S., MITTERMEIER, R.A. & WALKER-PAINEMILLA, K. (2012) Co-occurrence of linguistic and biological diversity in biodiversity hotspots and high biodiversity wilderness areas. *Proceedings of the National Academy of Sciences of the United States of America*, 109, 8032–8037.
- GUIBRUNET, L., GERRITSEN, P.R.W., SIERRA-HUELSZ, J.A., FLORES-DÍAZ, A.C., GARCÍA-FRAPOLLI, E., GARCÍA-SERRANO, E. et al. (2021) Beyond participation: how to achieve the recognition of local communities' value-systems in conservation? Some insights from Mexico. *People and Nature*, 3, 528–541.
- HLPE (HIGH LEVEL PANEL OF EXPERTS) (2017) *Sustainable Forestry for Food Security and Nutrition. A report by the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security*. HLPE, Rome, Italy. fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/HLPE-Report-11_EN.pdf [accessed January 2023].
- HUAMBACHANO, M.A. (2019a) Indigenous food sovereignty: reclaiming food as sacred medicine in Aotearoa New Zealand and Peru. *New Zealand Journal of Ecology*, 43, 3383.
- HUAMBACHANO, M.A. (2019b) Traditional ecological knowledge and indigenous foodways in the Andes of Peru. *Review of International American Studies*, 12, 87–110.
- ICKOWITZ, A., POWELL, B., SALIM, A. & SUNDERLAND, T. (2016) The effect of tree cover on child nutrition in Indonesia: examining the relationship between tree cover and consumption of micronutrient-rich foods. *PLOS ONE*, 11, e0154139.
- JAENICKE, H. & VIRCHOW, D. (2013) Entry points into a nutrition-sensitive agriculture. *Food Security*, 5, 679–692.
- KABRA, A. (2009) Conservation-induced displacement: a comparative study of two Indian protected areas. *Conservation and Society*, 7, 249–267.
- KABRA, A. (2018) Revisiting canons and dogmas in the conservation-versus-human rights debate. *Ecology, Economy and Society – The INSEE Journal*, 1, 83–86.
- KASHWAN, P. (2013) The politics of rights-based approaches in conservation. *Land Use Policy*, 31, 613–626.
- KASHWAN, P., DUFFY, R.V., MASSÉ, F., ASIYANBI, A.P. & MARIJNEN, E. (2021) From racialized neocolonial global conservation to an inclusive and regenerative conservation. *Environment*, 63, 4–19.
- KASIMBA, S.N., MOTSWAGOLE, B.S., COVIC, N.M. & CLAESSEN, N. (2018) Household access to traditional and indigenous foods positively associated with food security and dietary diversity in Botswana. *Public Health Nutrition*, 21, 1200–1208.
- KENNY, T.-A., FILLION, M., SIMPKIN, S., WESCHE, S.D. & CHAN, H.M. (2018) Caribou (*Rangifer tarandus*) and Inuit nutrition security in Canada. *EcoHealth*, 15, 590–607.
- KNUTH, L. & VIDAR, M. (2011) *Constitutional and Legal Protection of the Right to Food Around the World*. FAO, Rome, Italy. [oda-alc.org/documents/1340937409.pdf](https://www.oda-alc.org/documents/1340937409.pdf) [accessed January 2023].
- KUHNLEIN, H.V., RECEVEUR, O., SOUEIDA, R. & EGELAND, G.M. (2004) Arctic Indigenous peoples experience the nutrition transition with changing dietary patterns and obesity. *Journal of Nutrition*, 134, 1447–1453.
- LÓPEZ-CUBILLOS, S., MUÑOZ-ÁVILA, L., ROBERSON, L.A., SUÁREZ-CASTRO, A.F., OCHOA-QUINTERO, J.M., CROUZEILLES, R. et al. (2021) The landmark Escazú agreement: an opportunity to integrate democracy, human rights, and transboundary conservation. *Conservation Letters*, 15, e12838.
- LOURENÇO, A.E.P., SANTOS, R.V., ORELLANA, J.D.Y. & COIMBRA, C.E. A. (2008) Nutrition transition in Amazonia: obesity and socioeconomic change in the Suruí Indians from Brazil. *American Journal of Human Biology*, 20, 564–571.
- MACPHERSON, E., VENTURA, J.T. & OSPINA, F.C. (2020) Constitutional law, ecosystems, and Indigenous Peoples in Colombia: biocultural rights and legal subjects. *Transnational Environmental Law*, 9, 521–540.
- MCKERCHAR, C., LACEY, C., ABEL, G. & SIGNAL, L. (2021) Ensuring the right to food for indigenous children: a case study of stakeholder perspectives on policy options to ensure the rights of Tamariki Māori to healthy food. *International Journal for Equity in Health*, 20, 67.
- MECHLEM, K. (2004) Food security and the right to food in the discourse of the United Nations. *European Law Journal*, 10, 631–648.
- MORAND, S. & LAJAUNIE, C. (2021) Outbreaks of vector-borne and zoonotic diseases are associated with changes in forest cover and oil palm expansion at global scale. *Frontiers in Veterinary Science*, 8, 661063.
- NIELSEN, M.R., MEILBY, H., SMITH-HALL, C., POULIOT, M. & TREUE, T. (2018) The importance of wild meat in the Global South. *Ecological Economics*, 146, 696–705.
- NIKOLAKIS, W. & HOTTE, N. (2021) Implementing 'ethical space': an exploratory study of Indigenous–conservation partnerships. *Conservation Science and Practice*, 4, e580.
- NRDC (2020) *Why the World Must Commit to Protecting 30% of the Planet by 2030 (30x30)*. National Resource Defense Council, New York, USA. nrdc.org/sites/default/files/30x30-why-commit-fs.pdf [accessed January 2023].
- PADULOSI, S., ROY, P. & ROSADO-MAY, F.J. (2019) *Supporting Nutrition-Sensitive Agriculture through Neglected and Underutilized Species – Operational Framework*. International Fund for Agricultural Development, Rome, Italy. cgspace.cgiar.org/bitstream/handle/10568/102462/Supporting_Padulosi_2019_ENG.pdf [accessed January 2023].
- POPKIN, B.M. (2001) The nutrition transition and obesity in the developing world. *Journal of Nutrition*, 131, 871S–873S.
- POULIOT, M. & TREUE, T. (2013) Rural people's reliance on forests and the non-forest environment in West Africa: evidence from Ghana and Burkina Faso. *World Development*, 43, 180–193.
- RASOLOFOSON, R.A., RICKETTS, T.H., JACOB, A., JOHNSON, K.B., PAPPINEN, A. & FISHER, B. (2020) Forest conservation: a potential nutrition-sensitive intervention in low- and middle-income countries. *Frontiers in Sustainable Food Systems*, 4, 20.
- REED, J., ICKOWITZ, A., CHERVIER, C., DJOUDI, H., MOOMBE, K., ROS-TONEN, M. et al. (2020a) Integrated landscape approaches in the tropics: a brief stock-take. *Land Use Policy*, 99, 104822.
- REED, J., ROS-TONEN, M. & SUNDERLAND, T. (2020b) Introduction and background. In *Operationalizing Integrated Landscape Approaches in the Tropics* (eds J. Reed, T. Sunderland & M. Ros-Tonen), pp. 1–15. CIFOR, Bogor, Indonesia.
- REED, J., VAN VIANEN, J., DEAKIN, E.L., BARLOW, J. & SUNDERLAND, T. (2016) Integrated landscape approaches to managing social and environmental issues in the tropics: learning from the protected Areast to guide the future. *Global Change Biology*, 22, 2540–2554.
- ROCHE, M.L., CREED-KANASHIRO, H.M., TUESTA, I. & KUHNLEIN, H.V. (2008) Traditional food diversity predicts dietary quality for the Awajún in the Peruvian Amazon. *Public Health Nutrition*, 11, 457–465.
- RUDD, L., ALLEN, T., ALLRED, S., BIGGS, D., BRIGHT ROSS, J.G., DÁVALOS, A. et al. (2021) Overcoming racism in the twin spheres of conservation science and practice. *Proceedings of the Royal Society B*, 288, 20211871.

- SAJEVA, G. (2015) Rights with limits: biocultural rights – between self-determination and conservation of the environment. *Journal of Human Rights and the Environment*, 6, 30–54.
- SANTOSO, M. V., BEZNER KERR, R.N., KASSIM, N., MARTIN, H., MTINDA, E., NJAU, P. et al. (2021) A nutrition-sensitive agroecology intervention in rural Tanzania increases children's dietary diversity and household food security but does not change child anthropometry: results from a cluster-randomized trial. *Journal of Nutrition*, 151, 2010–2021.
- SAVAGE, A., McIVER, L. & SCHUBERT, L. (2019) Review: the nexus of climate change, food and nutrition security and diet-related non-communicable diseases in Pacific Island Countries and Territories. *Climate and Development*, 12, 120–133.
- SAYER, J., SUNDERLAND, T., GHAZOUL, J., PFUND, J.L., SHEIL, D., MEIJARD, E. et al. (2013) Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences of the United States of America*, 110, 8349–8356.
- SCHLEICHER, J., PERES, C.A., AMANO, T., LLACTAYO, W. & LEADER-WILLIAMS, N. (2017) Conservation performance of different conservation governance regimes in the Peruvian Amazon. *Scientific Reports*, 7, 11318.
- STANTON, C.R. (2014) Crossing methodological borders: decolonizing community-based participatory research. *Qualitative Inquiry*, 20, 573–583.
- SUNDERLAND, T.C. & VASQUEZ, W. (2020) Forest conservation, rights, and diets: untangling the issues. *Frontiers in Forests and Global Change*, 3, 11318.
- SURVIVAL INTERNATIONAL (2021) *WWF Accused of Deceit, Cover-Ups and Dishonesty in US Congressional Committee Hearing*. survivalinternational.org/news/12683 [accessed 15 December 2021].
- TAULI-CORPUZ, V., ALCORN, J., MOLNAR, A., HEALY, C. & BARROW, E. (2020) Cornered by protected areas: adopting rights-based approaches to enable cost-effective conservation and climate action. *World Development*, 130, 104923.
- TIMLER, C., ALVAREZ, S., DECLERCK, F., REMANS, R., RANERI, J., ESTRADA CARMONA, N. et al. (2020) Exploring solution spaces for nutrition-sensitive agriculture in Kenya and Vietnam. *Agricultural Systems*, 180, 102774.
- UNITED NATIONS. GENERAL ASSEMBLY (1948) *Universal Declaration of Human Rights*. United Nations. un.org/en/about-us/universal-declaration-of-human-rights [accessed 20 December 2021].
- VAN DER MERWE, J.D., CLOETE, P.C. & VAN DER HOEVEN, M. (2016) Promoting food security through Indigenous and traditional food crops. *Agroecology and Sustainable Food Systems*, 40, 830–847.
- VASQUEZ, W. & SUNDERLAND, T. (2021) *Conservation and the Right to Food*. openaccessgovernment.org/conservation-and-the-right-to-food/113509 [accessed 28 December 2021].
- WEERA SEKARA, P.C., WITHANACHCHI, C.R., GINIGADDARA, G.A.S. & PLOEGER, A. (2018) Nutrition transition and traditional food cultural changes in Sri Lanka during colonization and post-colonization. *Foods*, 7, 111.
- WEST, P., IGOE, J. & BROCKINGTON, D. (2006) Parks and peoples: the social impact of protected areas. *Annual Review of Anthropology*, 35, 251–277.
- WILSON, E.O. (2016) *Half-Earth: Our Planet's Fight for Life*. WW Norton & Company, London, UK.
- WITTER, R. & SATTERFIELD, T. (2019) The ebb and flow of Indigenous rights recognitions in conservation policy. *Development and Change*, 50, 1083–1108.