Biodiversity, Protected Areas, and Indigenous Communities: The shortcomings of modern conservation and lessons for the future

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Published on 16 November 2022

Abstract

Today's ecological crisis of unparalleled proportions has increased the urgency and need for ecological conservation. Organizations from small NGOs to entire governments contribute more resources yearly to the cause, yet the crises continue as if these efforts have almost no effect. Part of the reason for this stagnation is the Western focus on creating protected areas (PAs) as the primary conservation modality. This fixation on PAs results from a Western misunderstanding that dates back centuries, yet it is not a harmless mistake. The creation of PAs prompts the eviction of Indigenous peoples and local communities (IPLCs) who have lived on these lands and actively conserved the biodiversity within them for centuries. Evidence demonstrates that IPLCs are almost always more effective and cost-efficient at conserving biodiversity than PAs. However, more PAs are designated yearly while only a fraction of IPLC land is formally recognized. A global political economy rooted in colonial history props up this system of PAs by creating incentives to continue establishing parks and evicting local populations. In order to address the climate and biodiversity crises the world faces today, this paper posits the primacy of addressing a wrongful history and working in tandem with IPLCs to conserve the future.

Keywords: indigenous, conservation, climate change, ecology, biodiversity, land rights, local communities

1. Introduction

The conservation of natural areas and endangered species has become an ever more pressing issue in global politics as countries race to slow the effects of climate change. Large, protected ecosystems like the Amazon or Congo rainforests can mitigate the adverse effects of climate change and even reduce the amount of carbon in the atmosphere. Thus, policymakers and civil society organizations have become increasingly interested in creating legal protections for ecosystems and establishing

mechanisms to prevent their destruction. However, in this global race for conservation, one major ally has been left out—Indigenous peoples and local communities (IPLCs).

IPLCs have coexisted with their natural environment for centuries, deploying land and wildlife management techniques, including controlled burning, hunting, grazing, and more, to sustain themselves and preserve their ecosystems. Many of the standard indigenous tools for land and wildlife management have been emerging in practice by Western governments within the last decade, yet only after government policies failed. A classic example of this was the hyper-avoidance of forest fires in the US during the 20th century, which led to excess fuel loads and catastrophically worse fires in the following decades. The government now deploys a centuries-old indigenous technique, controlled burns, to manage most forests in the country.

This example demonstrates the invaluable knowledge of conservation that IPLCs can provide to governments and civil society, rooted in an intimate and ancient understanding of their local environment. Even further, these communities can serve as their ecosystems' most passionate and invested defenders. Unlike Western countries today, IPLCs are deeply connected to their natural environment, which is the primary source of their spirituality, sustenance, culture, and community. Thus, these communities have the most to lose concerning climate change, deforestation, desertification, and any other ecosystem-threatening phenomenon. IPLCs have demonstrated a profound commitment to ecological conservation and are willing to defend their land with their lives.[1]

With this understanding of IPLCs, it is clear that they may be the planet's most devoted ecological conservationists, though they rarely receive credit for it. According to a recent report by the ICCA Consortium (Indigenous Peoples' & Community Conserved Territories & Areas), IPLCs are actively conserving an estimated amount of at least 21 percent of the world's land area. This is equivalent to the size of the African continent.[2] Within these IPLC lands, these communities protect 33 percent of forests and 80 percent of biodiversity globally.[3] This vastly exceeds the land formally protected by governments, including national parks and protected reserves, covering only 14 percent of global lands.[4] IPLCs actively conserve more land than any government or private entity and are also more effective at it. According to one study, indigenous territories in Brazil, Australia, and Canada were home to more biodiversity than formally protected areas.[5] Another found that indigenous control of lands prevented deforestation to a greater extent than in formally protected areas.[6]

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[1] Global Witness. 2020. "Defending Tomorrow," Report. Global Witness.
[2] ICCA Consortium. 2021. "2021 Report." Territories of Life.
[3] Raygorodetsky, Gleb. 2018. "Indigenous peoples defend Earth's biodiversity—but they're in danger." National Geographic, November 16, 2018.
[4] ICCA Consortium. 2021. "2021 Report." Territories of Life.
[5] Schuster, Richard et al. 2019. Vertebrate biodiversity on indigenous-managed lands in Australia, Brazil, and Canada equals that in protected areas. Environmental Science & Policy 101 (Nov): 1–6.
[6] Tauli-Corpuz, V., Alcorn, J., Molnar, A., Healy, C., & Barrow, E. (2020). Cornered by PAs: Adopting rights-based approaches

Despite the growing evidence that highlights the success of IPLCs in achieving conservation goals, governments only recognize 10 percent of their lands worldwide.[7] Across the globe, IPLCs have different levels of control over their traditional lands, from the 21 percent they actively conserve (practicing land/resource management) to the 50 percent they customarily inhabit (living on the land with few rights).[8] [9] These communities are most effective at conserving their environment when granted formal land tenure rights (see Section V), yet this form of recognition is the least common worldwide. The fact that IPLCs have no formal method of obtaining legal ownership of their traditional lands in dozens of countries only exacerbates this problem.[10] Therefore, the focus of this analysis is two-fold.

First, this paper analyzes the existing conservation policies and practices of both IPLCs and Western governments. The primary research question to be examined is the nature of the relationship between IPLC land rights and ecological conservation. A variety of evidence supports the conclusion of a positive relationship between these variables—in other words, land rights for IPLCs translate to better conservation outcomes. Secondarily, another question emerges about why land rights for IPLCs lack support in many countries and within conservation movements if they have proven so effective. In order to explain the context of the current situation which prevents the widespread recognition of these rights, the paper discusses the political economy of conservation and existing attempts at reform. This paper concludes with details about policy recommendations for governments and civil society organizations based on the preceding analyses.

Prior research on the general themes of this topic is extensive. Existing literature discusses the origins and history of Western conservation, the history of human interaction with nature, indigenous relationships with nature, and the efficacy of varying ecological conservation practices and policies. Many of the arguments developed within this paper stem from this existing literature, as it is already well documented that IPLC land ownership creates better conservation outcomes. In existing research, one can also find that Western conservation methods are based on misconceptions of history and the environment and that conservation as a field is rooted in imperialism. Equally, the political economy of conservation and protected areas finds itself the target of additional publications.

However, prior research on this subject has failed to draw the connections between these research areas. Most publications referenced in this paper focus on one of the topics above or discuss a few in tandem. Nevertheless, none discuss the link between history, society, politics, and the economy, which explains the past and present situation in the field of conservation. This intersection is crucial in

to enable cost-effective conservation and climate action. World Development, 130, 1–13.

[7] Rights and Resources Initiative. 2015. "Who Owns the World's Land? A global baseline of formally recognized indigenous and community land rights." Washington DC: Rights and Resources Initiative.

[8] ICCA Consortium. 2021. "2021 Report." Territories of Life.

[9] Rights and Resources Initiative. 2020. "The Opportunity Framework 2020: Identifying Opportunities to Invest in Securing Collective Tenure Rights in the Forest Areas of Low- and Middle-Income Countries." Rights and Resources Initiative.

[10] Ibid.

setting the future direction of this field, yet it finds so few willing to discuss it candidly.

This paper will address this research gap by developing an integrated analysis of each aspect. The history of colonization which created the history of conservation is necessary to understand the very foundations of the field. The conceptual framework Western and indigenous societies have developed to understand their role in nature is integral in understanding how each society tries to conserve that nature. The current political economy underlines the modern conservation movement and explains the current state. Only when these factors are cross-analyzed can one understand the complex challenge that the conservation movement faces today.

I draw on evidence and ideas from Indigenous and non-Indigenous scholars in this paper. I acknowledge that I am a non-Indigenous academic informed by the knowledge of IPLCs and their representatives. I do not claim to speak on behalf of IPLCs and I acknowledge the vast diversity of culture, beliefs, and opinions held by Indigenous peoples around the world. I am grateful for the depth of knowledge and the perspectives shared with me that have formed the perspective of this paper.

II. The Origins of Conservation

The first industrial revolution was largely confined to Britain in the early 19th century and then diffused to the rest of Europe and the United States (US) in the latter half of the century. This period also coincided with the end of John F. Richards' 'unending frontier' of untamed wilderness, when California, Oregon, and Washington—initially settled by Europeans in the late 18th century—were admitted as states in the late 19th century. Europeans in their homelands and colonizer compatriots (who came to be Americans by nationality) had finally discovered the last of the unknown world.

This industrialization was seen as a core component of the civilized society Europeans and their descendants had created. However, such swift development of land and natural areas began to arouse worry among many. The establishment of Yellowstone, Wyoming, as the world's first national park in 1872 is the first example of how Europeans and their descendants (from now on, Westerners) attempted to quell these fears. The Yellowstone Act established the area as a "pleasuring-ground for the benefit and enjoyment of the people," which must be preserved "from injury or [spoliation], of all timber, mineral deposits, natural curiosities, or wonders within."[11] A century later, this idea had become embedded in the American psyche, exemplified by President John F. Kennedy's claim that national parks are "places where we can find release from the tensions of an increasingly industrialized civilization."[12] The creation of Yellowstone was a monumental moment in the history of conservation and is the starting point for explaining the Western conception of nature.

Environmental historian Rodrick Nash defines the Western social relationship with nature as one of

[11] National Parks Service. 2018. "Yellowstone National Park Protection Act (1872)." National Park Service.

[12] "Letter by John F. Kennedy, June 23, 1962", as printed in First World Conference on National Parks, ed. Alexander B. Adams (Washington, DC, 1964).

commodification. He argues that as societies in the West followed this path of urbanization and industrialization, unspoiled nature became a scarce commodity in high demand, increasing wild areas' marginal value. A "cosmopolitan social and economic class of nature lovers" emerged and advocated for the proliferation of protected areas (PAs) as they saw the nature within their urban communities quickly diminishing.[13] [14] Other scholars have elaborated on this idea to the extent that PAs were not only a commodity to enhance social utility but came to form an integral component of Western civilization. This sentiment was undoubtedly concretized by the founding director of UNESCO, Julian Huxley, when he claimed that "'in the modern world, a country without a national park can hardly be recognized as civilized."[15] In examining the work of various environmental historians, it becomes clear that the Western conceptualization of nature is preservation and delineation; nature is its own entity separate from civilization and must be protected so that it can provide pleasure and escape from an over-industrialized world.[16]

The conservationist movement came to life out of this conceptualization, taking on the responsibility of expanding PAs. As this movement took hold in the West, leading figures began to look outward with the self-imposed obligation to protect nature abroad. Thus, the Western conservation model—and, by default, the Western relationship with nature—was exported to Africa, Latin America, and Asia (from now on, the Global South), where conservationists leveraged the existing asymmetries of colonization and globalization as a means of achieving their goals. The idea that PAs and civilization came in concert fell neatly within the colonial rhetoric of the 'civilized' Europeans conquering the 'savages' of the Global South. This dynamic allowed conservationists working through non-governmental organizations (NGOs) to follow the armed forces of colonial powers into colonized nations and establish new parks and PAs. Colonial governments were quick to support the creation of these PAs as they pushed IPLCs, often nomadic pastoralists or subsistence agriculturalists, away from their traditional lands and into urban settlements, where they could be forced into labor. These new PAs came under the management of conservation NGOs, thus creating a new field of (Western) scientific governance and marginalizing alternative understandings of the same landscape. When these nations gained independence, the new postcolonial states of the Global South were eager to take advantage of the profits they could earn from the West by maintaining these PAs.[17]

In a century, the conservationist movement was born and proliferated rapidly. It was founded on the Western notion that nature is a pristine and valuable resource that must be protected to be enjoyed. First, public pressure and lobbying by NGOs led to the adoption of PAs across the

[13] Nash, Roderick. 2014. Wilderness and the American Mind: Fifth Edition. 343: Yale University Press.
[14] Nash, Roderick. "The American Invention of National Parks." American Quarterly 22, no. 3 (1970): 726–35.
[15] Neumann, Roderick P. 1998. Imposing wilderness: struggles over livelihood and nature preservation in Africa. 139: University of California Press.
[16] Höhler, Sabine, Patrick Kupper, and Bernhard Gissibl, eds. 2012. Civilizing Nature: National Parks in Global Historical Perspective. 1-27: Berghahn Books.
[17] Höhler et.al., Civilizing Nature, 1-27.

West. Then, the heavily asymmetrical power dynamics of the era allowed these ideas and policies to be exported to the Global South. Today, much of the modern conservation movement still finds itself protecting nature for pleasure-seeking; however, recent trends of rapid species extinction and climate change have shifted priorities towards the conservation and sustainable use of biodiversity.[18] Nevertheless, the Western conceptualization of nature has not fundamentally changed despite this shift in focus, which may explain why, despite the vast proliferation of PAs, the extinction rate is thousands of times higher than what it would naturally be and why the climate is changing at an ever-increasing pace.[19] One may question whether the Western understanding of nature is compatible with reality.

III. The Western Misconception

This history highlights the West's understanding of nature as something pure and untouched by humans. Thus, they practice what is commonly called 'fortress' conservation, where natural areas are walled off from human encroachment. As discussed, this idea of a 'wilderness' is rooted in the pre-19th century; Westerners had still yet to discover the entire world and thus assumed each discovery had been 'wild' before their arrival. When they did reach the limits of global land mass, they only knew how to preserve nature by segregating it from their civilization, thus leaving certain areas to continue to be genuinely 'wild.' However, this conceptualization is a very recent one, and is not representative of the reality of human history.

Many archaeological assessments, reconstructive models, and anthropogenic research have found that early human societies, including hunter-gatherer, subsistence agricultural, and nomadic pastoral societies, covered large swaths of global landmass and heavily shaped the landscapes they inhabited.[20] [21] [22] [23] [24] These studies found that early societies often co-inhabited landscapes and shaped them through a wide variety of low-intensity practices, including polycropping, transhumance, long and short fallow cultivation, and tree fallowing, among others. These subsistence practices created intricate mosaics of lands and diverse, dynamic, and productive ecosystems

[18] "UN Convention on Biological Diversity." 1993. Rio de Janeiro, Brazil: United Nations.

[19] World Wildlife Fund. 2020. "How many species are we losing?" WWF.

[20] Bliege Bird, R., & Nimmo, D. 2018. Restore the lost ecological functions of people. Nature ecology & evolution, 2(7), 1050–1052.

[21] Boivin, N., & Crowther, A. 2021. Mobilizing the past to shape a better Anthropocene. Nature ecology & evolution, 5(3), 273–284.

[22] Kirch, Patrick. 2002. Archaeology and global change: The Holocene record. Annual Review of Environment and Resources 30, 409–440 (2005).

[23] Boivin, Nicole L et al. 2016. "Ecological consequences of human niche construction: Examining long-term anthropogenic shaping of global species distributions." Proc Natl Acad Sci USA 113 (23): 6388-6396.

[24] Smith, Bruce D. 2011. "General patterns of niche construction and the management of 'wild' plant and animal resources by small-scale pre-industrial societies." Philos Trans R Soc Lond B Biol Sci. 366, no. 1566 (Mar): 836–848.

covering all stages of ecological succession, which were sustained for millennia.[25] [26] [27] [28] [29] [30]

Indeed, a recent global reconstruction of historical human populations and land usage—the most comprehensive and accurate model to date—supports this extensive collection of evidence. The reconstruction model generated striking results: the percentage of the global land area classified as 'wildland' (complete absence of human activity) decreased only 8 percent over the last 12,000 years, from a little more than 27 percent in 10,000 BCE to 19 percent today. On the other hand, cultured anthromes (areas with non-intensive land use practices) have dropped almost 43 percent, from nearly 73 percent in 10,000 BCE to just 30 percent today. The drastic increase of intensive anthromes (areas where more than 20 percent of the land is used intensively) explains this paradigm shift in human settlement: in the last 12,000 years, these areas have expanded by 51 percent.[31]

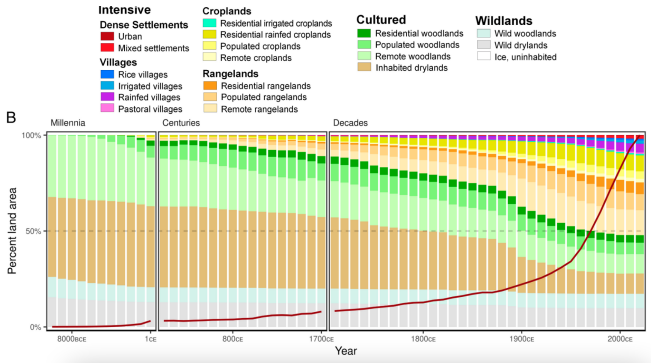


Figure 1.0. Ellis, Erle C. 2021. "People have shaped most of terrestrial nature for at least 12,000 years." Proc Natl Acad Sci U.S.A. 118, no. 17 (Apr): 3. See Notes for full image.

This evidence highlights the reality that, throughout history, the vast majority of human transformation of nature has not occurred through a recent conversion of wildlands to intensive anthromes but instead through the conversion of cultured anthromes to intensive ones. This change has occurred mostly since 1700 and most rapidly since 1900, driven principally by colonization, displacement, and material/labor extraction due to the industrial world economy.[32]

However, one of the most exciting findings of this study and global reconstruction model is the following: "Contemporary patterns of biodiversity-rich areas, areas prioritized for conservation, and those specifically labeled

[25] Fletcher, Michael-Shawn, Tegan Hall, and Andreas Nicholas Alexandra. 2021. "The loss of an indigenous constructed landscape following British invasion of Australia: An insight into the deep human imprint on the Australian landscape." Ambio 50, no. 1 (Jan): 138-149.

[26] Kay, Andrea U. et al. 2019. "Diversification, Intensification and Specialization: Changing Land Use in Western Africa from 1800 BC to AD 1500." Journal of World Prehistory 32, no. 2 (June): 179-228.

[27] Goldberg, Amy, Alexis M. Mychajliw, and Elizabeth A. Hadly. 2016. "Post-invasion demography of prehistoric humans in South America." Nature 532, no. 7598 (Apr): 232-5.

[28] Lightfoot, Kent G., Rob Q. Cuthrell, Chuck J. Striplen and Mark G. Hylkema. 2013. "Rethinking the Study of Landscape Management Practices Among Hunter-Gatherers in North America." American Antiquity 78: 285 - 301.

[29] Ellis, Erle C. 2015. "Ecology in an anthropogenic biosphere." Ecological Monographs 85, no. 3 (Aug): 287-331.

[30] Lombardo, Umberto et al. 2020. "Early Holocene crop cultivation and landscape modification in Amazonia." Nature 581, no. 7807 (May): 190-193.

[31] Ellis, Erle C. 2021. "People have shaped most of terrestrial nature for at least 12,000 years." Proc Natl Acad Sci U.S.A. 118, no. 17 (Apr): 1-8.

[32] Stephens, Lucas. 2019. "Archaeological assessment reveals Earth's early transformation through land use." Science 365, no. 6456 (Aug): 897-902.

'natural' all show long and significant histories of human use. The evidence indicates that the cultural natures of millennia and centuries ago are highly associated with and may have shaped current global patterns of key biodiversity areas, vertebrate species richness, and threatened species."[33]

These findings are crucial to understanding the current biodiversity and climate crises as they reveal the reality of human history that has been largely unknown or misrepresented. Humans lived in harmony with nature for millennia before the modern era of industrialization, shaping their landscapes and ecosystems extensively and positively affecting biodiversity—so much so that the ecological communities they created thousands of years ago are those most biologically enriched today. The cause of the current ecological crisis is not the loss of historical wildlands but the hyper-exploitation of land that has already been in use for the last 12,000 years. [34] As a result, the most successful solutions will focus on reshaping the existing human relationship with nature, not removing humans from nature altogether.[35] [36] The depiction of human use of nature as a recent and negative trend in an otherwise 'wild' world is incorrect and detrimental to developing sound and scientific remedies to the current crisis. The intersection of human culture and nature is the essential point of understanding for sustaining human life and biodiversity.[37] [38] [39] [40]

Now is the crucial moment where the leadership of IPLCs is needed more than ever. In contrast to the Western segregative conception of nature, they tend to have a more holistic and interwoven understanding of nature and human life, which links human and non-human elements in complex relationships.[41] From this viewpoint, humans are considered an essential component of nature, not a separate entity, and nature itself is thought to inherently possess social, cultural, and spiritual values.[42] Furthermore, IPLC conceptualizations of nature rely on the ethics of stewardship which are based on mutual exchange,

[33] Ellis, People have shaped, 1-8.
[34] Kennedy, Christina M. et al. 2019. "Managing the middle: A shift in conservation priorities based on the global human modification gradient." Glob Chang Biol 25, no. 3 (Mar): 811-826.
[35] Boivin, Mobilizing the past, 273–284.
[36] Wintle, Brendan A. et al. 2019. "Global synthesis of conservation studies reveals the importance of small habitat patches for biodiversity." Proc Natl Acad Sci USA 116, no. 3 (Jan): 909-914.
[37] Locke, Harvey et al. 2019. "Three global conditions for biodiversity conservation and sustainable use: an implementation framework." Natl Sci Rev 6, no. 6 (Nov): 1080-1082.
[38] Martin, Laura J. et al. 2014. "Conservation opportunities across the world's anthromes." Diversity and Distributions 20, no. 7 (July): 745-755.
[39] Garnett, Stephen T. et al. 2018. "A spatial overview of the global importance of Indigenous lands for conservation." Nature Sustainability 1, no. 7 (July): 369-374.
[40] Mokany, Karel et al. 2020. "Reconciling global priorities for conserving biodiversity habitat." Proc Natl Acad Sci USA 117, no. 18 (May): 9906-9911.
[41] Lyver, Phil O. et al. 2017. "Key Maori values strengthen the mapping of forest ecosystem services." Ecosystem Services 27:92-102.
[42] Coscieme, Luca et al. 2020. "Multiple conceptualizations of nature are key to inclusivity and legitimacy in global environmental governance." Environmental Science & Policy 104 (Feb): 36-42.

custodianship, and the interconnectedness of the health of humans and their environment.[43] [44]

This understanding, underpinned by a profoundly intimate connection between IPLCs and their natural environment, allowed for the flourishing of incredibly healthy and diverse ecological environments throughout human history. IPLCs have long understood what Western societies do not. However, the power asymmetries that have characterized the past few centuries have suppressed their knowledge from reaching mainstream scientific communities until recently. Unfortunately, the Western misconception of environmental degradation due to lost wildlands is driving the current solutions to the problem. Therefore, before analyzing different solutions, the West must first redress the conceptualization of nature that has driven conservation efforts astray.

IV. The Western Solution

As discussed, the Western segregative view of nature has led to the 'fortress' conservation style. The PA is the archetype of this conservation model, demonstrated by its rapid expansion over the past century. Today, there are approximately 251,952 PAs covering between 14 and 16 percent of the global landmass. [45] [46]

Not all PAs are harmful or ineffective: the establishment of the Serengeti National Park in Tanzania and the Maasai Mara National Reserve in Kenya have preserved the largest remaining overland migration in the world, where nearly 1.2 million wildebeest migrate annually.[47] However, the establishment of these PAs was predicated on the mass eviction of IPLCs relocated to communities just outside the parks.[48] This expulsion did not guarantee the protection of biodiversity within the Serengeti ecosystem. In fact, illegal hunting by IPLCs is threatening the wildebeest population, with one study estimating that up to 118,000 wildebeest are killed yearly.[49] Another study found that illegal hunting by IPLCs led to a dramatic reduction in buffalo populations and negative impacts on both impala and tobi populations.[50] A final study concluded that this illegal hunting in and around the Serengeti was primarily driven by the need for protein and subsistence incomes. It recommended sustainable hunting

[43] Pascua, Pua'ala et al. 2017. "Beyond services: A process and framework to incorporate cultural, genealogical, place-based, and indigenous relationships in ecosystem service assessments." Ecosystem Services 26, no. B (Aug): 465-475.
[44] Reo, Nicholas J. 2019. "Inawendiwin and Relational Accountability in Anishnaabeg Studies: The Crux of the Biscuit." Journal of Ethnobiology 39, no. 1 (Apr): 65-75.
[45] ICCA Consortium. 2021. "2021 Report." Territories of Life.
[46] Protected Planet. 2022. "Discover the World's Protected Areas." Protected Planet.
[47] Subalusky, Amanda L., Christopher L. Dutton, Emma J. Rosi, and David M. Post. 2017. "Annual mass drownings of the Serengeti wildebeest migration influence nutrient cycling and storage in the Mara River." Proc Natl Acad Sci USA 114, no. 29 (June): 7647-7652.
[48] International Work Group for Indigenous Affairs. 2022. "70,000 Maasai in Loliondo, Tanzania, face another forceful eviction." IWGIA.
[49] Moro, Mirko. 2013. "An investigation using the choice experiment method into options for reducing illegal bushmeat hunting in western Serengeti." Conservation Letters 6, no. 1 (Feb): 37-45.
[50] Campbell K, Borner M. 1995. Population trends and distribution of Serengeti herbivores: implications and management. Serengeti II: Dynamics, management and conservation of an ecosystem. ARE Sinclair and P Arcese. Chicago, Ill, University of Chicago Press. 117-145.

and benefit-sharing as core solutions to unsustainable hunting activity.[51]

This case study highlights the broader problem with fortress conservation: PAs may initially preserve wildlife habitats and increase biodiversity, but they cannot be sustainable long-term when they fail to address the needs of IPLCs who cohabitate the same land. PAs that are not reinforced by strong managerial practices and adequate funding, which further prevents resources from reaching IPLCs, exacerbates this issue. A collection of studies found that only 24 percent of the 73,000 PAs studied had sound management.[52] [53] [54] Additionally, funding in low-and middle-income countries is consistently insufficient, with only 7 percent of all global conservation funding allocated to parks in developing nations.[55]

Another issue with the fortress model is that a significant proportion of key biodiversity areas (KBAs) are located outside PAs and within areas managed by IPLCs.[56] Evicting these communities to establish more PAs gives rise to unique challenges. In the case of the Biligiri Rangaswamy Temple Wildlife Sanctuary in India, the relocation of IPLCs led to the take over of *Lantana camara*, an invasive weed, which had previously been kept under control by customary burning practices.[57] In the case of the Dja Faunal Reserve in Cameroon, an Indigenous community known as the Batwa was evicted from their ancestral lands to establish an elephant protection zone. However, the elephants within the park followed the Batwa outside of the PA, as they had grown accustomed to the protection provided by the tribe from poachers, thus rendering the new PA useless for achieving its original purpose.[58]

A collection of studies has found that removing IPLCs from their ancestral lands—and consequently the banishment of their land management practices, including fire, forestry, and hunting—can lead to declines in biodiversity and ecosystem productivity, particularly in the

[51] Mfunda, Iddi M. and Eivin Røskaft. 2010. "Bushmeat hunting in Serengeti, Tanzania: An important economic activity to local people." International Journal of Biodiversity and Conservation 2: 263-272.
[52] Deguignet, Marine et al. 2017. "Measuring the extent of overlaps in protected area designations." PLoS One 12 (11).
[53] Juffe-Bignoli, D. et al. (2014). Protected Planet Report. Cambridge, UK: UNEP-WCMC.
[54] Leverington, Fiona et al. 2010. "A global analysis of protected area management effectiveness." Environmental Management 46 (5): 685-698.
[55] Waldron, Anthony. 2013. "Targeting global conservation funding to limit immediate biodiversity declines." Proc Natl Acad Sci USA 110 (29): 12144–12148.
[56] Tauli-Corpuz, Vicky et al. 2020. "Cornered by PAs: Adopting rights-based approaches to enable cost-effective conservation and climate action." World Development 130 (June): 1-13.
[57] Rai, Nitin D., Tor A. Benjaminsen, Siddhartha Krishnan, and C. Madegowda. 2019. "Political ecology of tiger conservation in India: Adverse effects of banning customary practices in a protected area." Singapore Journal of Tropical Geography 40, no. 1 (Jan): 124-139.
[58] Tauli-Corpuz, Cornered by PAs, 1-13.

most vulnerable early-succession habitats.[59]. [60] [61] [62] [63] The evidence presented in this section suggests two main conclusions. First, PAs can initially achieve desired goals of biodiversity preservation yet are vulnerable due to inadequate support and conflict with IPLCs. Second, various negative environmental consequences have been documented when IPLCs are removed from their ancestral lands to create new PAs. Accordingly, the scientific community and policy makers can assume that PAs play an essential role in conservation but they should view these areas as an element of the broader solution, not a panacea.

V. The Transformational Power of Traditional Knowledge

Indigenous peoples alone hold tenure rights or de facto control over vast swaths of land worldwide. As previously stated, one report estimates that IPLCs are actively conserving at least 21 percent of global land area, the equivalent of the entire African continent.[64] Another study estimates that Indigenous peoples alone hold tenure rights or de facto control over approximately 38 million square kilometers of land globally, spanning more than 25 percent of the global terrestrial area.[65] Another study estimates that a population of roughly 2.5 billion IPLCs cover more than 50 percent of the global landmass when looking at customary management instead of formal recognition or control.[66] Any of these estimates are significantly larger than the total land held under PAs, estimated between 14 and 16 percent. [67] [68] The key difference between IPLC-managed lands and PAs is the role of traditional knowledge (TK) in Indigenous/local communities, which is coming to play a vital role in the future of biodiversity conservation.

Within the past two decades, the Western scientific community has finally recognized the value of this unique type of knowledge. TK has since enhanced scientific understanding of "species' ranges, baselines, and trends and contributed to mapping, monitoring, and reporting changes in local biodiversity, including collective evidence of resource overexploitation, invasive species expansion,

[59] Early-succession habitats are created following a significant disturbance (e.g., forest fire) and are characterized by their open space, lack of forest canopy, and predominant grass and shrub-covered terrain. They support a wide diversity of species and are precious habitats but can quickly develop into late-succession habitats if they are not disturbed. Therefore, human-induced disturbances can be very important.

[60] Bird, RB et al. 2008. "The fire stick farming hypothesis: Australian Aboriginal foraging strategies, biodiversity, and anthropogenic fire mosaics." Proc. Natl. Acad. Sci. 105, no. 39 (Sep): 14796–14801.

[61] Dunwiddie, Peter W., Jonathan D. Bakker, Mitchell Almaguer-Bay, and Carson B. Sprenger. 2011. "Environmental History of a Garry Oak/Douglas-Fir Woodland on Waldron Island, Washington." Northwest Science 85 (2): 130-140.

[62] Gedalof, Ze'ev, Marlow Pellatt, and Dan J. Smith. 2006. "From prairie to forest: three centuries of environmental change at Rocky Point, Vancouver Island, British Columbia." Northwest Science 80 (1): 34-46.

[63] MacDougall, Andrew S. 2008. "Herbivory, hunting, and long-term vegetation change in degraded savanna." Biological Conservation 141, no. 9 (Sep): 2174-2183.

[64] ICCA Consortium. 2021. "2021 Report." Territories of Life.

[65] Garnett, Stephen T. et al. 2018. "A spatial overview of the global importance of Indigenous lands for conservation." Nature Sustainability 1, no. 7 (July): 369-374.

[66] Rights and Resources Initiative. 2020. "The Opportunity Framework 2020: Identifying Opportunities to Invest in Securing Collective Tenure Rights in the Forest Areas of Low- and Middle-Income Countries." Rights and Resources Initiative.

[67] ICCA Consortium. 2021. "2021 Report." Territories of Life.

[68] Protected Planet. 2022. "Discover the World's Protected Areas." Protected Planet.

pollution, and climate change impacts".[69] This is because TK is built from Indigenous understandings of ecosystems that date back millennia, and TK employs what the West considers 'advanced' scientific practices. One study found that traditional knowledge systems are highly similar to adaptive management systems, emphasizing learning through feedback and treating uncertainty as an inherent characteristic of ecosystems.[70] Other studies have found that TK systems analyze causal relationships in nature with a significant degree of complexity and nuance, so much so that Indigenous knowledge often leads to breakthroughs in the scientific community.[71] [72]

In the South of India, TK challenged an existing hypothesis that wildfires in the Western Ghats exacerbated the spread of an invasive weed species. After conducting extensive interviews with the Indigenous Soliga tribe in the region, one study found evidence to disprove the existing hypothesis, commenting that the community's knowledge was "particularly noteworthy for the nuance that they bring to the understanding of fire regimes."[73] While IPLCs have harbored this 'scientifically advanced' TK since before the Scientific Revolution, it is only within the last two decades that the Western scientific community has come to recognize its merits.

TK encapsulates not only the understanding of local ecosystems but also the most sustainable ways for humans to interact with their environment. Indeed, various studies have confirmed that IPLC land management practices create a number of positive outcomes for conservation. A collection of studies found that Indigenous cultural practices can provide important ecological functions, including habitat expansion, species population control, seed dispersal, and enhanced soil nutrient availability.[74] [75] [76] [77] [78] [79] One study of intact forest landscapes found that deforestation and forest degradation occur much slower on

[69] Reyes-García, Victoria. 2022. "Recognizing Indigenous peoples' and local communities' rights and agency in the post-2020 Biodiversity Agenda." Ambio 51, no. 1 (Jan): 84-92.
[70] Berkes, Fikret, Johan Colding, and Carl Folke. 2000. "Rediscovery of Traditional Ecological Knowledge as Adaptive Management." Ecological Applications 10, no. 5: 1251–62.
[71] McDaniel, Josh, Deborah Kennard, and Alicia Fuentes. 2005. "Smokey the Tapir: Traditional Fire Knowledge and Fire Prevention Campaigns in Lowland Bolivia." Society & Natural Resources 18 (10): 921-931.
[72] Sundaram, Bharath, Siddhartha Krishnan, Ankila J. Hiremath, and Gladwin Joseph. 2012. "Ecology and Impacts of the Invasive Species, Lantana camara, in a Social-Ecological System in South India: Perspectives from Local Knowledge." Human Ecology 40, no. 6 (Dec): 931–942.
[73] ibid.
[74] Fletcher, Michael-Shawn, Tegan Hall, and Andreas Nicholas Alexandra. 2021. "The loss of an indigenous constructed landscape following British invasion of Australia: An insight into the deep human imprint on the Australian landscape." Ambio 50, no. 1 (Jan): 138-149.
[75] Smith, Bruce D. 2011. "General patterns of niche construction and the management of 'wild' plant and animal resources by small-scale pre-industrial societies." Philos Trans R Soc Lond B Biol Sci. 366, no. 1566 (Mar): 836–848.
[76] Bliege Bird, Rebecca, Nyalangka Tayor, Brian F. Codding, and Douglas W. Bird. 2013. "Niche construction and Dreaming logic: aboriginal patch mosaic burning and varanid lizards (Varanus gouldii) in Australia." Proc Biol Sci 280, no. 1772 (Dec): 1-7.
[77] Guimarães, Paulo, Jr. R., Mauro Galetti, and Pedro Jordano. 2008. "Seed Dispersal Anachronisms: Rethinking the Fruits Extinct Megafauna Ate." PLoS One 3, no. 3 (Mar): 1-13.
[78] Marshall, Fiona et al. 2018. "Ancient herders enriched and restructured African grasslands." Nature 561, no. 7723 (Sep): 387-390.
[79] Palace, Michael et al. 2017. "Ancient Amazonian populations left lasting impacts on forest structure." Ecosphere 8, no. 12 (Dec): 1-19.

IPLC lands than within PAs.[80] Another study of biodiversity in Australia, Brazil, and Canada found that these land management techniques led to a higher degree of native and rare species richness and an equivalent level of overall species richness compared to PAs.[81] A final study found that IPLC territories have created critical habitats for various endangered species. Over a quarter of endangered species worldwide have more than half of their habitat within IPLC territories.[82]

Yet another layer of TK is community-based institutions and governance, and yet again, numerous studies have demonstrated the benefits this can have for conservation. While IPLCs practice their land management techniques on the large amounts of the territory they inhabit worldwide, governments only recognize the legal ownership of around 10 percent of IPLC lands.[83] There is a crucial difference between customary land management and legal ownership. Under the latter, IPLCs are given formal rights to exercise their own traditional governance over the land (environmental self-determination). When IPLCs can exercise environmental self-determination, studies have found even more considerable ecological benefits, including increased biological productivity, ecosystem restoration, pollutant reductions, and fewer wildfires.[84] [85] [86] [87] An analysis published last month also found that formally recognized IPLC lands absorb twice as much carbon dioxide as other land areas.[88] Customary IPLC land management brings about positive local conservation outcomes. Yet, the right to environmental self-determination unlocks an entirely new level of environmental benefits that can extend to regional and even global proportions.

A final argument in favor of TK is not related to the ecological benefits it can provide but the cost savings it can generate. As demonstrated, TK can drastically enhance conservation efforts, yet IPLCs receive almost no public or private funding to achieve these results. In fact, IPLCs actually *invest* between 15 to 23 percent of the total amount spent on conservation by the public and private

[80] Fa, Julia E. et al. 2020. "Importance of Indigenous Peoples' lands for the conservation of Intact Forest Landscapes." Frontiers in Ecology and the Environment 18, no. 3 (Apr): 135-140.
[81] Schuster, Richard et al. 2019. "Vertebrate biodiversity on indigenous-managed lands in Australia, Brazil, and Canada equals that in protected areas." Environmental Science & Policy 101 (Nov): 1–6.
[82] O'Bryan, Christopher J. et al. 2021. "The importance of Indigenous Peoples' lands for the conservation of terrestrial mammals." Conservation Biology 35, no. 3 (Jun): 1002-1008.
[83] Rights and Resources Initiative. 2015. "Who Owns the World's Land? A global baseline of formally recognized indigenous and community land rights." Washington DC: Rights and Resources Initiative.
[84] Ens, Emilie et al. 2016. "Putting indigenous conservation policy into practice delivers biodiversity and cultural benefits." Biodiversity and Conservation 25 (Sep): 2889–2906.
[85] Reyes-García, Victoria et al. 2019. "The contributions of Indigenous Peoples and local communities to ecological restoration." Restoration Ecology 27, no. 1 (Jan): 3-8.
[86] Fernández-Llamazares, Álvaro et al. 2020. "A State-of-the-Art Review of Indigenous Peoples and Environmental Pollution." Integr Environ Assess Manag 16, no. 3 (May): 324–341.
[87] Nelson, Andrew, and Kenneth M. Chomitz. 2011. "Effectiveness of strict vs. multiple use protected areas in reducing tropical forest fires: a global analysis using matching methods." PLoS One 6, no. 8 (Aug): 1-14.
[88] World Resources Institute and Climate Focus. 2022. "Sink or swim: How Indigenous and community lands can make or break nationally determined contributions." Edited by Climate Focus. Forest Declaration Assessment: 2.

sectors worldwide.[89] This investment comes in the form of both cash and labor and is concentrated in the Global South, where adequate conservation funding is most scarce. However, millions of dollars continue to be invested in PAs despite the evidence highlighting the cost-effectiveness of IPLC community conservation. A review of fourteen studies found five key cost advantages provided by community conservation models: 1) savings on institution-building and maintenance costs; 2) savings on compensation provided to communities displaced/affected by PAs; 3) savings on conflict mediation related to PA creation; 4) savings on law enforcement costs; and 5) higher employment rates, improved livelihoods, and reduced welfare costs.[90] Overall, IPLCs are more cost-effective at achieving conservation goals, as they spend less per hectare to achieve the same, if not (often) better, outcomes than PAs.[91]

This research review has revealed much about the contributions of IPLCs to conservation globally. These communities collectively manage between 21 and 50 of the global landmass, depending on the level of recognition. When IPLCs manage a land area, various positive biodiversity outcomes emerge; however, when IPLCs are given the right to environmental self-determination, the benefits expand to the regional and even global scale. Furthermore, the IPLC community conservation model is more cost-effective than traditional PA models, and IPLCs are already investing substantial resources in pursuing conservation objectives. Why have the scientific community, conservation NGOs, and government agencies not embraced this model? The cause is largely a political economy driven by the West, which has incentivized political leaders in the Global South to maintain the system of PAs.

VI. The Political Economy of Protected Areas

Even though environmental self-determination by IPLCs has proven to be one of the most effective models of conservation to date, the fact remains that only 10 percent (14,400,000 square kilometers) of global IPLC lands are officially recognized.[92] On the other hand, the number of PAs continues to grow each year, covering up to 24 million square kilometers globally and thus outnumbering the amount of recognized IPLC landmass by almost 10 million square kilometers.[93] The Global South is the target of this debate, as it is home to the majority of existing PAs, the majority of the global IPLC population, and the majority of Earth's intact forests and biodiversity.

Broadly speaking, countries in the Global South have yet to implement frameworks for granting IPLCs the right to environmental self-determination due to insufficient financial resources, organizational capacity, or political

[89] Tauli-Corpuz, Vicky et al. 2020. "Cornered by PAs: Adopting rights-based approaches to enable cost-effective conservation and climate action." World Development 130 (June): 1-13.
[90] ibid.
[91] Gray, Erin et al. 2015. "The economic costs and benefits of securing community forest tenure: evidence from Brazil and Guatemala." Washington, DC: World Resources Institute.
[92] Rights and Resources Initiative. 2015. "Who Owns the World's Land? A global baseline of formally recognized indigenous and community land rights." Washington DC: Rights and Resources Initiative.
[93] Protected Planet. 2022. "Discover the World's Protected Areas." Protected Planet.

will.[94] However, the primary culpability does not necessarily lie with the governments of these countries, although they are certainly complicit. Instead, the driving force behind the proliferation of PAs and the obstruction of the environmental self-determination of IPLCs is the political economy of PAs created by the West.

As briefly mentioned in Section II, after independence, many elite postcolonial leaders engaged in negotiations with the political elite of the West to maintain the status quo of PAs created during colonial times. In exchange, these new states would receive reputational gains, economic benefits, or political recognition by the West. The first example of such an inter-elite bargain was the Arusha Manifesto, in which the first president of Tanzania, Julius Nyerere, implicitly signed away the right to determine which parts of the country would become PAs in exchange for technical expertise and economic resources.[95] Furthermore, outside of the initial negotiations which took place in the years after independence, the relatively easy availability of international funding for conservation programs has driven the political elite in the Global South to continue exploiting such assistance for rent-seeking.[96]

Again, the political elite in the Global South cannot entirely be blamed for this phenomenon, as they are taking advantage of the opportunities offered by Western countries to increase financial inflows into their cash-strapped economies. Thus, while these elite are guilty of opportunism, a greater fault lies in Western policymaking, which has prioritized the creation of PAs and created strong economic incentives for developing countries to do so.

Indeed, many political economy scholars have given a harsh assessment of the rapid expansion of PAs, dubbing the process 'green imperialism' driven by conservation NGOs and "scientists doing God's work with a divine mission to save the Earth."[97] Further analysis has supported this assessment, noting a growing demand by the West to financialize natural areas, which has caused a massive appropriation of land in what one author calls the 'green grab' due to the involvement of Western corporations and NGOs.[98] The creation of PAs generates revenue for the developing countries that create them. However, Western conservation NGOs and corporations also earn revenue due to the growing demand for ecotourism. In 2019 the ecotourism market brought in $92.2 billion; by 2027, this market is expected to grow to $103.8 billion. Of the ten corporations with the highest market share in this industry, only two, one of which a foreigner owns, have their

[94] Rights and Resources Initiative. 2020. "The Opportunity Framework 2020: Identifying Opportunities to Invest in Securing Collective Tenure Rights in the Forest Areas of Low- and Middle-Income Countries." Rights and Resources Initiative.
[95] Neumann, Roderick P. 1998. Imposing Wilderness: Struggles Over Livelihood and Nature Preservation in Africa. 140: University of California Press.
[96] Nelson, Fred. 2011. "Blessing or curse? The political economy of tourism development in Tanzania." Journal of Sustainable Tourism 20, no. 3 (Dec): 359-375.
[97] Chapin, Mac. 2004. "A Challenge to Conservationists." World Watch Magazine, Nov/Dec, 2004: 21.
[98] Fairhead, James, Melissa Leach, and Ian Scoones. 2012. "Green Grabbing: a new appropriation of nature?" The Journal of Peasant Studies 39, no. 2 (Apr): 237-261.

headquarters in the Global South.[99] Thus, it is clear that one of the main drivers of PA expansion today is the profits these areas can provide for Western corporations. In turn, these corporations place political pressure on their governments to continue offering these incentives and on the governments of developing countries to continue designating PAs. While, in theory, this should be a positive conservation outcome, this article has demonstrated that PAs do not provide the vast ecological benefits they supposedly should. Instead, these market pressures create a dependence on tourism with adverse spillover effects for local economies and populations.

This ecotourism reliance leads governments to favor the more profitable markets of elite and foreign tourism with a disregard for the rights of IPLCs to their traditional land, resources, cultural practices, and livelihoods.[100] When analyzing why governments have favored PAs over IPLC community conservation, the key is understanding who reaps the benefits and bears the costs.

It is already clear that the benefits of ecotourism and PA provision are concentrated within the elite of developing countries and among Western corporations and NGOs. Nevertheless, while Western governments provide economic incentives to developing countries to continue expanding PAs, this rarely comes in direct funding for the creation/maintenance of these areas, as noted in Section IV. Instead, incentives are usually part of broader economic packages or technical assistance programs.[101] The governments of developing countries and conservation NGOs also fail to pay the necessary costs of maintaining PAs, as one study found systematic failures across the Global South.[102] With inadequate financing from external actors, IPLCs are left to pay the opportunity costs associated with PAs. These communities lose access to their traditional sources of sustenance and livelihoods as they are pushed into settlements surrounding the parks and receive little to no compensation for their lost source of revenue and employment.[103] [104] Studies estimate that the creation of PAs has displaced an estimated 10 million IPLCs worldwide, with numerous reports of violent evictions. [105]

When governments and NGOs will not or cannot finance the costs of PAs, it is easy to pass the burden onto IPLCs, who already tend to be poorer and more politically marginalized than the rest of the population.[106] This is especially true of less-democratic countries (where the majority of PAs are located) since the populations that the

[99] Correa, David. 2021. "Global Ecotourism Market to Generate $103.8 Billion by 2027: AMR." GlobeNewswire.

[100] Tauli-Corpuz, Vicky et al. 2020. "Cornered by PAs: Adopting rights-based approaches to enable cost-effective conservation and climate action." World Development 130 (June): 1-13.

[101] Neumann, Roderick P. 1998. Imposing Wilderness: Struggles Over Livelihood and Nature Preservation in Africa. 140: University of California Press.

[102] Tauli-Corpuz, Vicky et al. 2020. "Cornered by PAs: Adopting rights-based approaches to enable cost-effective conservation and climate action." World Development 130 (June): 1-13.

[103] Balmford, Andrew, and Tony Whitten. 2003. "Who Should Pay for Tropical Conservation, and How Could the Costs Be Met?" Oryx 37, no. 2. Cambridge University Press: 238–50.

[104] Kashwan, Prakash. 2016. "Power asymmetries and institutions: landscape conservation in central India." Regional Environmental Change 16, no. 1 (Aug): 1-13.

[105] West, Paige, James Igoe, and Dan Brockington. 2006. "Parks and peoples: The social impact of protected areas." Annual Review of Anthropology 35 (Sep): 251-277.

[106] Brechin, Steven R et al. 2002. "Beyond the Square Wheel: Toward a More Comprehensive Understanding of Biodiversity Conservation as Social and Political Process." Society and Natural Resources 15 (1): 41-64.

governments of these countries displace and burden by creating PAs have a difficult time holding them to account.[107]

Accordingly, it becomes clear that the proliferation of PAs over the past century has been less about promoting genuine conservation goals and more about the political and economic incentives associated with their creation. The elite and policymakers of developing countries have exploited conservation policy "for their own political ends, which may or may not include conservation."[108] Furthermore, these political and economic incentives driving PA expansion are undermining biodiversity conservation goals due to the costs and pressures they place on IPLCs, the primary defenders of biodiversity.[109] [110] As already mentioned in this paper, this argument is not meant to invalidate the role of PAs completely. In fact, under appropriate policies and with adequate funding, PAs have been found to benefit IPLCs through increased income and employment opportunities and better integration into the national economy.[111] Instead, this assessment is a cautionary warning about the potential for exploitation that underlies the political economy of PAs.

VII. The Current Situation

Having now undertaken a broad assessment of the historical path of conservation, the proposed solutions to the current biodiversity crisis, and the factors that have shaped the relative success or failure of these solutions, it is crucial to understand where the world stands today on this issue. This paper has demonstrated that the Western fortress conservation model is based on a historical misunderstanding of the natural world and the role of humans within it. The driving force behind the proliferation of this model was originally the power asymmetries created by colonization and, more recently, the asymmetries present in the global political economy. These have prevented the wide-scale recognition of IPLC land rights and environmental self-determination, which has proven to be the most effective form of conservation studied.

Many efforts exist to rectify this injustice and push the global community and conservation efforts towards a more pro-IPLC approach. In response to growing public pressure to address the conflict between PAs and IPLCs, the International Institute for Environment and Development (IIED) gathered a summit of the largest conservation NGOs in the world. This summit, called the Conservation Initiative on Human Rights (CIHR), concluded with a white paper published in 2014, which created a framework for assessing progress on IPLC rights standards and establishing grievance mechanisms for

[107] Kashwan, Prakash. 2017. "Inequality, democracy, and the environment: A cross-national analysis." Ecological Economics 131 (Jan): 139-151.
[108] Gibson, Clark C. 1999. Politicians and Poachers: The Political Economy of Wildlife Policy in Africa. Back cover: Cambridge University Press.
[109] Rodrigues, Ana S L. et al. 2004. "Effectiveness of the global protected area network in representing species diversity." Nature 428, no. 6983 (Apr): 640-643.
[110] Naughton-Treves, Lisa, Margaret B. Holland, and Katrina Brandon. 2005. "The role of protected areas in conserving biodiversity and sustaining local livelihoods." Annual Review of Environment and Resources 30 (Nov): 219-252.
[111] Andam, Kwaw S. et al. 2010. "Protected areas reduced poverty in Costa Rica and Thailand." Proc Natl Acad Sci USA 107, no. 22 (Jun): 9996-10001.

violations of these rights.[112] [113] The IIED has made some progress over the past eight years, yet a gap remains between commitment and action. On one hand, the establishment of a grievance mechanism seems to have stalled. However, they have made at least some progress in improving rights standards, including the publication of a set of IPLC rights standards for conservation projects in 2016.[114] Additionally, the organization launched an initiative on biocultural heritage in 2020, where it sent a team of researchers partnered with local indigenous researchers to study four Indigenous communities. The team assessed IPLC food systems and conservation methods to make policy recommendations for sustainable development. Their findings led to the creation of a model for development based on the needs and realities of IPLCs.[115]

Furthermore, the International Union for Conservation of Nature (IUCN) hosted its 2003 World Parks Congress (WPC) in Durban, where there were emerging discussions on the use of rights-based approaches and the importance of TK.[116] In the following year, the IUCN's World Conservation Congress (WCC) established a framework for a rights-based approach and a target for the restitution of IPLC lands. [117] However, there are few examples of restitution since the WCC and participant countries have made little progress on implementing a rights-based approach.[118] In 2011, the IUCN established the Whakatane Mechanism, where IPLCs could file complaints about rights violations. The Mechanism would mediate and recommend that the respective governments rectify these violations. Despite three successful pilot assessments between 2011-2014, the governments in question never implemented the recommendations due to a lack of financial support and political interest. The Mechanism has since not been used.[119] However, the IUCN has made strides in improving the rights standards of IPLCs, and in September of 2021, they organized the first World Summit of Indigenous Peoples and Nature. The summit led to the creation of a Global Indigenous Agenda, which puts the voices of IPLCs in charge of dictating the needs of their communities and allows them to put forward solutions, proposals, and a call to action.[120]

Additionally, the Convention on Biological Diversity (CBD), a multilateral treaty under the United Nations (UN), has made progress toward recognizing the contributions of IPLCs and working toward a global

[112] CIHR. 2014. "Human rights in conservation: Progress since Durban." White paper.
[113] Jonas, Harry, Jael Makagon, and Dilys Roe. 2016. "Conservation standards: From rights to responsibilities," IIED Discussion Paper. London: IIED.
[114] IIED. 2022. "Human rights standards for conservation: rights, responsibilities and redress." International Institute for Environment and Development.
[115] Tran, Khanh. 2021. "Indigenous biocultural heritage for sustainable development." International Institute for Environment and Development.
[116] DeRose, Anne Marie. 2004. "Overview of community participation at the Vth IUCN World Parks Congress." Protected Areas Programme: 18.
[117] MacKay, Fergus. 2002. "Addressing Past Wrongs: Indigenous Peoples and Protected Areas: The Right to Restitution of Lands and Resources," FPP Occasional Paper. Forest Peoples Programme.
[118] United Nations. 2016. Report of the Special Rapporteur of the Human Rights Council on the rights of indigenous peoples. Victoria Tauli-Corpuz. A771/229. Geneva: United Nations.
[119] ibid.
[120] IUCN. 2022. "World Summit and Indigenous Agenda | IUCN." International Union for Conservation of Nature - IUCN.

rights-based approach. In 2000, the conference of parties (COP) of the treaty created a program of work to implement Article 8(j), which is targeted at enhancing the role of IPLCs in achieving the goals of the CBD. This led to the adoption of four voluntary guidelines, covering topics such as respecting the cultural heritage and sacred sites of IPLCs, ensuring free, prior, and informed consent of IPLCs for accessing their knowledge and using their lands, benefit-sharing, and the sustainable use of biodiversity.[121] In 2010 the COP agreed to the Aichi Biodiversity Targets, which included two targets emphasizing the rights of IPLCs and the respectful/consensual use of their knowledge.[122] However, not a single one of the twenty targets was met by the 2020 deadline, casting doubts on the post-2020 framework to be ratified in August 2022.[123]

The last significant development of IPLC rights in the global conservation community was the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), written by Indigenous leaders and adopted by the General Assembly in 2007. The UNDRIP contains key articles on land and resource rights, protection of traditional knowledge, free, prior, informed consent regarding policies that affect them, etc.[124]

All four of these major efforts in addressing the contribution of IPLCs to global biodiversity conservation and attempts to rectify past wrongdoings have importantly laid the foundation for a more pro-IPLC future. They start with the vital work of promoting rights standards when working with IPLCs and centering the voices of IPLCs in these decision-making processes. However, these initiatives have so far not been able to address the root cause of this issue—the lack of legal avenues for IPLCs to attain land tenure rights and the political economy of PAs, which incentivizes countries to avoid granting these rights. While these existing efforts are essential and must be built upon, more must be done to address these underlying issues.

VIII. Policy Recommendations

A. Center Indigenous voices across all levels of the conservation movement and strengthen mechanisms for IPLCs to express grievance and seek restitution and justice.

One seemingly obvious but grossly underutilized solution to many of the problems of the modern conservation movement is to center Indigenous voices. In far too many conferences, work programs, negotiations, research studies, etc., IPLCs are viewed as the target instead of the participant. In order to move toward meaningful reforms in conservation movements, **IPLCs must be leaders in all discussions, negotiations, and research conducted on all levels, from small NGOs to multinational organizations.** This may involve sidelining other qualified experts in these activities and events. However, in these cases, it is imperative to remember how IPLCs have been sidelined since colonial

[121] Convention on Biological Diversity. 2021. "Working Group on Article 8(j)." Convention on Biological Diversity.
[122] Convention on Biological Diversity. 2020. "Aichi Biodiversity Targets." Convention on Biological Diversity.
[123] Kukreti, Ishan. 2020. "World hasn't met a single Aichi biodiversity target: Leaked UN Report." Down To Earth, September 10, 2020.
[124] General Assembly of the UN. 2007. "United Nations Declaration of the Rights of Indigenous Peoples." New York: United Nations.

times. It is also important to remember that a lack of Western formal education and training qualifications may not be as relevant when IPLCs possess generations of traditional knowledge. Thus, a lack of Western qualifications should not be a reason to exclude IPLCs from these spaces. The conservation movement is already flush with the voices of highly qualified Western scientists and academics and can only stand to gain from the inclusion of IPLC knowledge and experience.

Additionally, the long history of sidelining IPLCs mentioned must not be forgotten, and ongoing actions which continue to sideline these communities must be addressed. **A global reporting mechanism is needed to better understand the scope of existing grievances and claims for restitution and to monitor progress by domestic governments, donors, and conservation NGOs in responding to these claims.** Given its history with the Whakatane Mechanism, the IUCN would likely be best equipped to develop such a reporting mechanism, but it must be careful not to extend its scope too broad. The Whakatane Mechanism likely failed because it attempted to serve as a global court of justice, where grievance and restitution claims could be submitted, deliberated on, and solved with recommendations. Instead, a new mechanism should take its place and serve as a catalog of IPLC claims and of subsequent progress towards addressing those claims by relevant actors (governments, donors, and NGOs). Such a mechanism would provide an accurate, independent, and publicly available overview of existing claims. It would also incentivize conservation actors to make more progress on these issues or risk public backlash.[125]

Lastly, after creating such a reporting mechanism, the findings should be used to encourage Truth and Reconciliation Initiatives (TRIs) in countries with significant claims against them. These initiatives could highlight the ongoing flaws of PAs under dispute, demonstrate the limits of the current PA system, and underscore the value of collaboration with IPLCs.[126] Countries with successful existing TRIs, such as Canada, Australia, and South Africa, could serve as a global model and provide technical support to countries establishing new initiatives. The large-scale adoption of TRIs could expose systemic problems within countries but highlight more global systemic issues and create public pressure to review the international conservation paradigm.

Implementing these three recommendations would significantly advance progress on rectifying previous violations of the rights of IPLCs and create positive pressures to uphold the rights of these communities moving forward.

B. Eliminate government incentives for PAs and replace them with incentives for legal recognition of IPLC territory

To address the underlying political economy driving IPLCs off their lands, **Western donor countries must eliminate economic and political incentives for**

[125] Makagon, Jael. 2014. "Human Rights Standards for Conservation, Part III. Which redress mechanisms are available to communities affected by conservation initiatives?" IIED Discussion Paper. London: IIED.
[126] Tauli-Corpuz, Vicky et al. 2020. "Cornered by PAs: Adopting rights-based approaches to enable cost-effective conservation and climate action." World Development 130 (June): 1-13.

developing countries to establish new PAs. Western bilateral and multilateral aid agencies must change their policies to prevent the release of official development assistance on the condition of PA creation. Western governments must also refrain from exchanging political incentives, like enhanced relations or political recognition, for PA creation. Multilateral financial institutions like the World Bank and International Monetary Fund must equally eliminate the provision of concessional loans in exchange for expanding PAs. **Instead, these institutions should provide the same incentives in cases where recipient countries grant IPLCs legal recognition and environmental self-determination in key biodiversity areas.** These policy changes would create substantial economic and political pressures to stop the expansion of strict PAs and focus on increasing the rights of IPLCs.

C. Shift Western donor investments towards land tenure reforms

In addition to the economic and political incentives needed to promote the legal recognition of IPLC land rights, **direct investments to implement land tenure reforms must also be made by NGOs, Western governments, or Western multilateral financing institutions, depending on the specific conditions of the recipient country.** One study surveyed the level of readiness different countries have to undertake land tenure reforms to recognize IPLCs' right to their land and resources. It found three broad levels of investment size required depending on country conditions.[127] Countries in the first tier require small-scale, local investments to increase trust, capacity, or legal frameworks that would prepare the institutional environment for more significant future investments. These investments would be most impactful from NGOs and other civil society organizations. They could include projects like a rights recognition pilot or a proof of concept project to demonstrate the feasibility of land tenure reforms. Countries in the second tier are prepared for medium-scale projects on the sub-national level and should range around $1 million per year. These investments should be aimed at offering grants and technical assistance directly to IPLCs and supporting NGOs in their efforts to secure tenure rights for their communities, which would enable the scaling up of similar projects on the sub-national level. Countries in the third tier are ready for large-scale investments at the national level, which would be most effective coming directly from bilateral donors or multilateral financial institutions like the World Bank. These projects would focus on scaling existing sub-national land tenure reforms to the national level by strengthening legal frameworks and government capacity. Regardless of the investment size, this policy change would begin to strengthen the legal avenues IPLCs have access to in the process of gaining rights to their land and achieving environmental self-determination.

[127] Rights and Resources Initiative. 2020. "The Opportunity Framework 2020: Identifying Opportunities to Invest in Securing Collective Tenure Rights in the Forest Areas of Low- and Middle-Income Countries." Rights and Resources Initiative.

IX. Conclusion

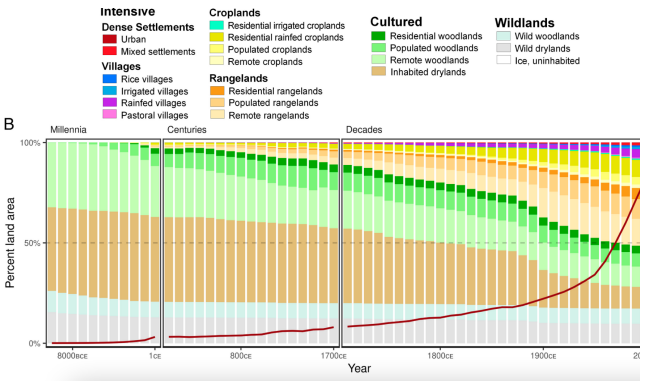
Indigenous peoples have inhabited and cultivated their environments for thousands of years, creating some of the most biologically diverse and successful ecosystems on the planet. A common cultural trait unites a highly diverse set of global Indigenous communities—the inextricable link between humans and nature. This belief allowed Indigenous peoples and their environments to thrive for so long and this understanding can change the current trajectory of biodiversity loss and climate change. Yet, this will not be possible without the leadership of IPLCs and the reconciliation of Western societies with their past. The West has constructed false narratives of what nature truly is and has fought insatiably to preserve that idea. It is time for Western leaders, scientists, and conservationists to revisit their fields' history and rethink their relationship with the natural world.

Protected areas are not the scapegoat of this situation, and this paper does not claim they are universally unhelpful. Under the right conditions, PAs can be a practical conservation method and are sometimes the only viable solution to specific challenges. That is not to say, however, that PAs are the panacea that conservationists have been preaching as the core solution to the biodiversity crisis. Addressing the legal status of land already under conservation by IPLCs is a cause of far more potential for the global conservation community. The reduced costs and improved outcomes demonstrated in this paper are even more reasons to invest resources into IPLCs. The policy recommendations detailed in the preceding section outline a path forward on this front. However, making actual progress towards addressing the world's most significant challenges will require changes at a far greater level.

The story of human history depicted in Section III highlights a lesson of utmost importance to the future. The world embarked on a trend of rapid and sustained industrialization and expansion in the late 18th century that has yet to meet its end. The industrial revolution forever changed humanity in many ways for the better, but it also fundamentally redefined the relationship between humans and nature. The world has experienced an unprecedented loss of cultured anthromes, places where human cultural activities interacted with the environment harmoniously. In its place, intensive anthromes have thrived, where the relationship between human activities and the environment becomes exploitative and destructive. To understand today's ecological crises, one must understand the paradigm shift in human society that caused them. As much as there is a desire to continue this trend of never-ending growth by rebranding it with the term 'green,' the true path to restoring the relationship humans once had with their environment may be through a sort of degrowth. Such a transformation will require a profound reassessment of Western society as it stands today and will require the leadership of those who have lived in harmony with nature for millennia.

X. Notes

Figure 1.0. Ellis, Erle C. 2021. "People have shaped most of terrestrial nature for at least 12,000 years." Proc Natl Acad Sci U.S.A. 118, no. 17 (Apr): 3. Taken from Fig. 1 in the source article.



B) Global changes in anthrome areas, with population changes indicated by the red line. Anthromes are classified using population densities and dominant intensive land use. Wildlands are defined by zero population and no intensive land use (urban + crops + grazing), Cultured anthromes have low populations and <20% intensive use, and Intensive anthromes are ≥20% intensive. Cultured and Intensive anthromes are further stratified by population densities, in persons km−2, as Remote (>0 to <1), Populated (1 to <10), Residential (10 to <100), Inhabited (>0 to <100), Villages and Mixed settlements (100 to <2,500), and Urban (≥2,500). Intensive anthromes are further stratified based on their dominant intensive land use area ≥20% in order of most intensive use (urban > rice > irrigated > cropped > pastured). Woodlands combine all forest and woodland biomes (73); drylands comprise the remaining biomes, from savanna to tundra, excluding permanent ice.

XI. Acknowledgements

As mentioned in the final paragraph of Section I, the knowledge shared with me through personal interactions with various Indigenous individuals as well as the written work of Indigenous scholars has contributed greatly to the perspective of this paper. Additionally, my experience traveling and working with the Katie Adamson Conservation Fund over many years helped to shape various aspects of this paper. I would like to acknowledge that organization for its commitment to working with IPLCs as a partner in conservation initiatives around the world. Lastly, I would like to acknowledge the hundreds of thousands of Indigenous peoples who have been displaced, impoverished, or killed in the name of conservation. The losses these communities have suffered are not only their tragedy but ours as well.

XII. Bibliography

Andam, Kwaw S. 2010. "Protected areas reduced poverty in Costa Rica and Thailand." *Proc Natl Acad Sci USA* 107, no. 22 (Jun): 9996-10001. https://doi.org/10.1073/pnas.0914177107.

Bliege Bird, Rebecca, Nyalangka Tayor, Brian F. Codding, and Douglas W. Bird. 2013. "Niche construction and Dreaming logic: aboriginal patch mosaic burning and varanid lizards (Varanus gouldii) in Australia." *Proc Biol Sci* 280, no. 1772 (Dec): 1-7. https://doi.org/10.1098/rspb.2013.2297.

Boivin, Nicole L., Melinda A. Zeder, Dorian Q. Fuller, Alison Crowther, Greger Larson, Jon M. Erlandson, Tim Denham, and Michael D. Petraglia. 2016. "Ecological consequences of human niche construction: Examining long-term anthropogenic shaping of global species

distributions." *Proc Natl Acad Sci USA* 113 (23): 6388-6396. https://doi.org/10.1073%2Fpnas.1525200113.

Brechin, Steven R. 2002. "Beyond the Square Wheel: Toward a More Comprehensive Understanding of Biodiversity Conservation as Social and Political Process." *Society and Natural Resources* 15 (1): 41-64q. https://doi.org/10.1080/089419202317174011.

Chapin, Mac. 2004. "A Challenge to Conservationists." *World Watch Magazine*, Nov/Dec, 2004. https://fdocuments.net/document/a-challenge-to-conservationists.html.

CIHR. 2014. "Human rights in conservation: Progress since Durban." White paper. http://www.thecihr.org/s/CIHR_HRs-since-Durban_2014-cl8w.pdf

Convention on Biological Diversity. 2020. "Aichi Biodiversity Targets." Convention on Biological Diversity. https://www.cbd.int/sp/targets/.

Convention on Biological Diversity. 2021. "Working Group on Article 8(j)." Convention on Biological Diversity. https://www.cbd.int/convention/wg8j.shtml.

Correa, David. 2021. "Global Ecotourism Market to Generate $103.8 Billion by 2027: AMR." GlobeNewswire. https://www.globenewswire.com/news-release/2021/01/18/2160003/0/en/Global-Ecotourism-Market-to-Generate-103-8-Billion-by-2027-AMR.html.

Coscieme, Luca. 2020. "Multiple conceptualizations of nature are key to inclusivity and legitimacy in global environmental governance." *Environmental Science & Policy* 104 (Feb): 36-42. https://doi.org/10.1016/j.envsci.2019.10.018.

Deguignet, Marine. 2017. "Measuring the extent of overlaps in protected area designations." *PLoS One* 12 (11). https://doi.org/10.1371/journal.pone.0188681.

Dunwiddie, Peter W., Jonathan D. Bakker, Mitchell Almaguer-Bay, and Carson B. Sprenger. 2011. "Environmental History of a Garry Oak/Douglas-Fir Woodland on Waldron Island,

Washington." *Northwest Science* 85 (2): 130-140. https://doi.org/10.3955/046.085.0205.

Ellis, Erle C. 2015. "Ecology in an anthropogenic biosphere." *Ecological Monographs* 85, no. 3 (Aug): 287-331. https://doi.org/10.1890/14-2274.1.

Ellis, Erle C. 2021. "People have shaped most of terrestrial nature for at least 12,000 years." *Proc Natl Acad Sci U.S.A.* 118, no. 17 (Apr): 1-8. 10.1073/pnas.2023483118.

Ens, Emilie. 2016. "Putting indigenous conservation policy into practice delivers biodiversity and cultural benefits." *Biodiversity and Conservation* 25 (Sep): 2889–2906. https://doi.org/10.1007/s10531-016-1207-6.

Fa, Julia E. 2020. "Importance of Indigenous Peoples' lands for the conservation of Intact Forest Landscapes." *Frontiers in Ecology and the Environment* 18, no. 3 (Apr): 135-140. https://doi.org/10.1002/fee.2148.

Fairhead, James, Melissa Leach, and Ian Scoones. 2012. "Green Grabbing: a new appropriation of nature?" *The Journal of Peasant Studies* 39, no. 2 (Apr): 237-261. https://doi.org/10.1080/03066150.2012.671770.

Fernández-Llamazares, Álvaro. 2020. "A State-of-the-Art Review of Indigenous Peoples and Environmental Pollution." *Integr Environ Assess Manag* 16, no. 3 (May): 324–341. https://doi.org/10.1002%2Fieam.4239.

Fletcher, Michael-Shawn, Tegan Hall, and Andreas Nicholas Alexandra. 2021. "The loss of an indigenous constructed landscape following British invasion of Australia: An insight into the deep human imprint on the Australian landscape." *Ambio* 50, no. 1 (Jan): 138-149. 10.1007/s13280-020-01339-3.

Garnett, Stephen T. 2018. "A spatial overview of the global importance of Indigenous lands for conservation." *Nature Sustainability* 1, no. 7 (July): 369-374. https://doi.org/10.1038/s41893-018-0100-6.

Gedalof, Ze'ev, Marlow Pellatt, and Dan J. Smith. 2006. "From prairie to forest: three centuries of environmental change at Rocky Point, Vancouver

Island, British Columbia." *Northwest Science* 80 (1): 34-46.

General Assembly of the UN. 2007. "United Nations Declaration of the Rights of Indigenous Peoples." New York: United Nations.

Gibson, Clark C. 1999. *Politicians and Poachers: The Political Economy of Wildlife Policy in Africa*. N.p.: Cambridge University Press.

Global Witness. 2020. "Defending Tomorrow," Report. Global Witness. https://www.globalwitness.org/documents/19938/Defending_Tomorrow_EN_high_res_-_July_2020.pdf.

Goldberg, Amy, Alexis M. Mychajliw, and Elizabeth A. Hadly. 2016. "Post-invasion demography of prehistoric humans in South America." *Nature* 532, no. 7598 (Apr): 232-5. 10.1038/nature17176.

Guimarães, Paulo, Jr. R., Mauro Galetti, and Pedro Jordano. 2008. "Seed Dispersal Anachronisms: Rethinking the Fruits Extinct Megafauna Ate." *PLoS One* 3, no. 3 (Mar): 1-13. https://doi.org/10.1371%2Fjournal.pone.0001745.

Höhler, Sabine, Patrick Kupper, and Bernhard Gissibl, eds. 2012. *Civilizing Nature: National Parks in Global Historical Perspective*. N.p.: Berghahn Books.

ICCA Consortium. 2021. "2021 Report." Territories of Life. https://report.territoriesoflife.org/wp-content/uploads/2021/09/ICCA-Territories-of-Life-2021-Report-FULL-150dpi-ENG.pdf.

International Work Group for Indigenous Affairs. 2022. "70,000 Maasai in Loliondo, Tanzania, face another forceful eviction." IWGIA. https://www.iwgia.org/en/news/4597-maasai-loliondo-tanzania-forceful-eviction.html.

Jonas, Harry, Jael Makagon, and Dilys Roe. 2016. "Conservation standards: From rights to responsibilities," IIED Discussion Paper. London: IIED. http://pubs.iied.org/14666IIED.

Kashwan, Prakash. 2016. "Power asymmetries and institutions: landscape conservation in central India." *Regional Environmental Change* 16, no. 1

(Aug): 1-13. https://link.springer.com/article/10.1007/s10113-015-0925-8.

Kashwan, Prakash. 2017. "Inequality, democracy, and the environment: A cross-national analysis." *Ecological Economics* 131 (Jan): 139-151. https://doi.org/10.1016/j.ecolecon.2016.08.018.

Kay, Andrea U. 2019. "Diversification, Intensification and Specialization: Changing Land Use in Western Africa from 1800 BC to AD 1500." *Journal of World Prehistory* 32, no. 2 (June): 179-228. 10.1007/s10963-019-09131-2.

Kennedy, Christina M. 2019. "Managing the middle: A shift in conservation priorities based on the global human modification gradient." *Glob Chang Biol* 25, no. 3 (Mar): 811-826. 10.1111/gcb.14549.

Kukreti, Ishan. 2020. "World hasn't met a single Aichi biodiversity target: Leaked UN Report." *Down To Earth*, September 10, 2020. https://www.downtoearth.org.in/news/wildlife-biodiversity/world-hasn-t-met-a-single-aichi-biodiversity-target-leaked-un-report-73314.

Leverington, Fiona. 2010. "A global analysis of protected area management effectiveness." *Environmental Management* 46 (5): 685-698. https://doi.org/10.1007/s00267-010-9564-5.

Locke, Harvey. 2019. "Three global conditions for biodiversity conservation and sustainable use: an implementation framework." *Natl Sci Rev* 6, no. 6 (Nov): 1080-1082. 10.1093/nsr/nwz136.

Lombardo, Umberto. 2020. "Early Holocene crop cultivation and landscape modification in Amazonia." *Nature* 581, no. 7807 (May): 190-193. 10.1038/s41586-020-2162-7.

Lyver, Phil O. 2017. "Key Maori values strengthen the mapping of forest ecosystem services." *Ecosystem Services* 27:92-102. 10.1016/j.ecoser.2017.08.009.

MacDougall, Andrew S. 2008. "Herbivory, hunting, and long-term vegetation change in degraded savanna." *Biological Conservation* 141, no. 9 (Sep): 2174-2183. https://doi.org/10.1016/j.biocon.2008.07.003.

MacKay, Fergus. 2002. "Addressing Past Wrongs: Indigenous Peoples and Protected Areas: The

Right to Restitution of Lands and Resources," FPP Occasional Paper. Forest Peoples Programme. https://www.forestpeoples.org/en/topics/rights-land-natural-resources/publication/2010/addressing-past-wrongs-%E2%80%93-indigenous-peoples-an.

Marshall, Fiona. 2018. "Ancient herders enriched and restructured African grasslands." *Nature* 561, no. 7723 (Sep): 387-390. https://doi.org/10.1038/s41586-018-0456-9.

Martin, Laura J. 2014. "Conservation opportunities across the world's anthromes." *Diversity and Distributions* 20, no. 7 (July): 745-755. https://doi.org/10.1111/ddi.12220.

McDaniel, Josh, Deborah Kennard, and Alicia Fuentes. 2005. "Smokey the Tapir: Traditional Fire Knowledge and Fire Prevention Campaigns in Lowland Bolivia." *Society & Natural Resources* 18 (10): 921-931. https://doi.org/10.1080/08941920500248921.

Mokany, Karel. 2020. "Reconciling global priorities for conserving biodiversity habitat." *Proc Natl Acad Sci USA* 117, no. 18 (May): 9906-9911. 10.1073/pnas.1918373117.

Moro, Mirko. 2013. "An investigation using the choice experiment method into options for reducing illegal bushmeat hunting in western Serengeti." *Conservation Letters* 6, no. 1 (Feb): 37-45. https://doi.org/10.1111/j.1755-263X.2012.00284.x.

Nash, Roderick. 1970. "The American Invention of National Parks." *American Quarterly* 22 (3): 726-35. https://doi.org/10.2307/2711623.

Nash, Roderick. 2014. *Wilderness and the American Mind: Fifth Edition*. N.p.: Yale University Press.

National Parks Service. 2018. "Yellowstone National Park Protection Act (1872)." National Park Service. https://www.nps.gov/yell/learn/management/yellowstoneprotectionact1872.htm.

Naughton-Treves, Lisa, Margaret B. Holland, and Katrina Brandon. 2005. "The role of protected areas in conserving biodiversity and sustaining

local livelihoods." *Annual Review of Environment and Resources* 30 (Nov): 219-252. https://doi.org/10.1146/annurev.energy.30.050504.164507.

Nelson, Andrew, and Kenneth M. Chomitz. 2011. "Effectiveness of strict vs. multiple use protected areas in reducing tropical forest fires: a global analysis using matching methods." *PLoS One* 6, no. 8 (Aug): 1-14. https://doi.org/10.1371/journal.pone.0022722.

Nelson, Fred. 2011. "Blessing or curse? The political economy of tourism development in Tanzania." *Journal of Sustainable Tourism* 20, no. 3 (Dec): 359-375. https://doi.org/10.1080/09669582.2011.630079.

Neumann, Roderick P. 1998. *Imposing wilderness: struggles over livelihood and nature preservation in Africa*. 139-140.: University of California Press.

O'Bryan, Christopher J. 2021. "The importance of Indigenous Peoples' lands for the conservation of terrestrial mammals." *Conservation Biology* 35, no. 3 (Jun): 1002-1008. https://doi.org/10.1111/cobi.13620.

Osterhammel, Jürgen. 2006. *Europe, the "West" and the Civilizing Mission*. N.p.: German Historical Institute.

Palace, Michael. 2017. "Ancient Amazonian populations left lasting impacts on forest structure." *Ecosphere* 8, no. 12 (Dec): 1-19. https://doi.org/10.1002/ecs2.2035.

Pascua, Pua'ala. 2017. "Beyond services: A process and framework to incorporate cultural, genealogical, place-based, and indigenous relationships in ecosystem service assessments." *Ecosystem Services* 26, no. B (Aug): 465-475. https://doi.org/10.1016/j.ecoser.2017.03.012.

Protected Planet. 2022. "Discover the World's Protected Areas." Protected Planet. https://www.protectedplanet.net/en.

Rai, Nitin D., Tor A. Benjaminsen, Siddhartha Krishnan, and C. Madegowda. 2019. "Political ecology of tiger conservation in India: Adverse effects of banning customary practices in a protected area." *Singapore Journal of Tropical Geography* 40, no. 1 (Jan): 124-139. https://doi.org/10.1111/sjtg.12259.

Raygorodetsky, Gleb. 2018. “Indigenous peoples defend Earth's biodiversity—but they're in danger.” *National Geographic*, November 16, 2018. https://www.nationalgeographic.com/environment/article/can-indigenous-land-stewardship-protect-biodiversity-.

Reo, Nicholas J. 2019. “Inawendiwin and Relational Accountability in Anishnaabeg Studies: The Crux of the Biscuit.” *Journal of Ethnobiology* 39, no. 1 (Apr): 65-75. https://doi.org/10.2993/0278-0771-39.1.65.

Reyes-García, Victoria. 2019. “The contributions of Indigenous Peoples and local communities to ecological restoration.” *Restoration Ecology* 27, no. 1 (Jan): 3-8. https://doi.org/10.1111/rec.12894.

Reyes-García, Victoria. 2022. “Recognizing Indigenous peoples' and local communities' rights and agency in the post-2020 Biodiversity Agenda.” *Ambio* 51, no. 1 (Jan): 84-92. 10.1007/s13280-021-01561-7.

Rights and Resources Initiative. 2015. “Who Owns the World’s Land? A global baseline of formally recognized indigenous and community land rights.” Washington DC: Rights and Resources Initiative. https://rightsandresources.org/wp-content/uploads/GlobalBaseline_web.pdf.

Rights and Resources Initiative. 2020. “The Opportunity Framework 2020: Identifying Opportunities to Invest in Securing Collective Tenure Rights in the Forest Areas of Low- and Middle-Income Countries.” Rights and Resources Initiative. PDF. https://doi.org/10.53892/RHAA9312.

Rodrigues, Ana S L. 2004. “Effectiveness of the global protected area network in representing species diversity.” *Nature* 428, no. 6983 (Apr): 640-643. https://doi.org/10.1038/nature02422.

Schuster, Richard. 2019. “Vertebrate biodiversity on indigenous-managed lands in Australia, Brazil, and Canada equals that in protected areas.” *Environmental Science & Policy* 101 (Nov): 1-6. https://doi.org/10.1016/j.envsci.2019.07.002.

Smith, Bruce D. 2011. “General patterns of niche construction and the management of ‘wild’ plant

and animal resources by small-scale pre-industrial societies." *Philos Trans R Soc Lond B Biol Sci.* 366, no. 1566 (Mar): 836–848. 10.1098/rstb.2010.0253.

Stephens, Lucas. 2019. "Archaeological assessment reveals Earth's early transformation through land use." *Science* 365, no. 6456 (Aug): 897-902. 10.1126/science.aax1192.

Subalusky, Amanda L., Christopher L. Dutton, Emma J. Rosi, and David M. Post. 2017. "Annual mass drownings of the Serengeti wildebeest migration influence nutrient cycling and storage in the Mara River." *Proc Natl Acad Sci USA* 114, no. 29 (June): 7647-7652. https://doi.org/10.1073/pnas.1614778114.

Sundaram, Bharath, Siddhartha Krishnan, Ankila J. Hiremath, and Gladwin Joseph. 2012. "Ecology and Impacts of the Invasive Species, Lantana camara, in a Social-Ecological System in South India: Perspectives from Local Knowledge." *Human Ecology* 40, no. 6 (Dec): 931–942. http://dx.doi.org/10.1007/s10745-012-9532-1.

Tauli-Corpuz, Vicky. 2020. "Cornered by PAs: Adopting rights-based approaches to enable cost-effective conservation and climate action." *World Development* 130 (June): 1-13. https://doi.org/10.1016/j.worlddev.2020.104923.

"UN Convention on Biological Diversity." 1993. Rio de Janeiro, Brazil: United Nations.

United Nations. 2016. Report of the Special Rapporteur of the Human Rights Council on the rights of indigenous peoples. Victoria Tauli-Corpuz. A771/229. Geneva: United Nations.

Waldron, Anthony. 2013. "Targeting global conservation funding to limit immediate biodiversity declines." *Proc Natl Acad Sci USA* 110 (29): 12144–12148. 10.1073/pnas.1221370110.

West, Paige, James Igoe, and Dan Brockington. 2006. "Parks and peoples: The social impact of protected areas." *Annual Review of Anthropology* 35 (Sep): 251-277. https://doi.org/10.1146/annurev.anthro.35.081705.123308.

Wintle, Brendan A. 2019. "Global synthesis of conservation studies reveals the importance of small habitat patches for biodiversity." *Proc Natl Acad Sci USA* 116, no. 3 (Jan): 909-914. 10.1073/pnas.1813051115.

World Resources Institute and Climate Focus. 2022. "Sink or swim: How Indigenous and community lands can make or break nationally determined contributions." Edited by Climate Focus. Forest Declaration Assessment. https://www.climatefocus.com/publications/sink-or-swim-how-indigenous-and-community-lands-can-make-or-break-nationally-determined.

World Wildlife Fund. 2020. "How many species are we losing?" WWF. https://wwf.panda.org/discover/our_focus/biodiversity/biodiversity/.