

Review

Community-based approaches to biodiversity finance

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Indigenous peoples and local communities live in, manage, and own large regions and require investment to finance their biodiversity management strategies. Their approaches are proactive and powerful, with clear agency to drive futures that include consistent biodiversity finance. Our literature review and illustrative case studies highlight five factors that influence how communities forge pathways based on their world views and knowledge systems, underpinned by recognition of rights, compensation for damage by colonizers, and establishment of organizations with culturally valid governance to leverage biodiversity finance. Global actors, such as the Parties to the Convention on Biological Diversity implementing the Kunming-Montreal Global Biodiversity Framework, need to understand the history and characteristics of these pathways and tailor their finance to suit — for example, to finance governance and organizational development for some and protected area management for others.

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Introduction

Community-based biodiversity finance arises through locally grounded efforts by Indigenous peoples and local communities (IPs & LCs) to integrate culturally sensitive socioeconomic development with conservation of nature and culture [1]. Multiple benefits derive: social, for example, reinvigorating cultural practices, self-determination, and Indigenous languages, giving these life and placing them back in the landscape [2]; economic, for example, increasing income, community skills, and technologies [3]; and environmental, for example, conserving diverse habitats and biota [4–6]. Nevertheless, community-based approaches face many challenges: funding shortfalls [7], top-down conservation initiatives that clash with local land-use strategies [8], contrasting perspectives on wildlife values [9], and many others [1]. Here, we review approaches driven by communities for biodiversity finance, rather than in response to initiatives from others.

We address three questions: how do communities leverage biodiversity finance? what are the implications for others seeking to support communities? and consequently, what are the implications for future development of research, policy, and practice? This literature review was guided by our experiences as Indigenous and non-Indigenous researchers in communities across Australia, Paraguay, Chile, and Canada and is illustrated

by six case studies. These case study communities are proactive and powerful, with clear agency to determine and innovate their own sustainable futures that include biodiversity finance, rather than being only recipients of policy and donations driven by others [10].

Typology

Our evidence-based typology, developed iteratively from literature review, co-author discussions, and case study analysis (see Methods in the Supplementary File) identifies five factors that influence how communities leverage finance: (1) community world views and knowledge systems; (2) community drivers and actions; (3) opposing drivers; (4) points of anchorage; and (5) finance mechanisms (Figure 1). Illustrative case studies demonstrate the analytical utility of this typology (see Table 1 and S2).

Community worldviews and knowledge systems relevant to biodiversity finance

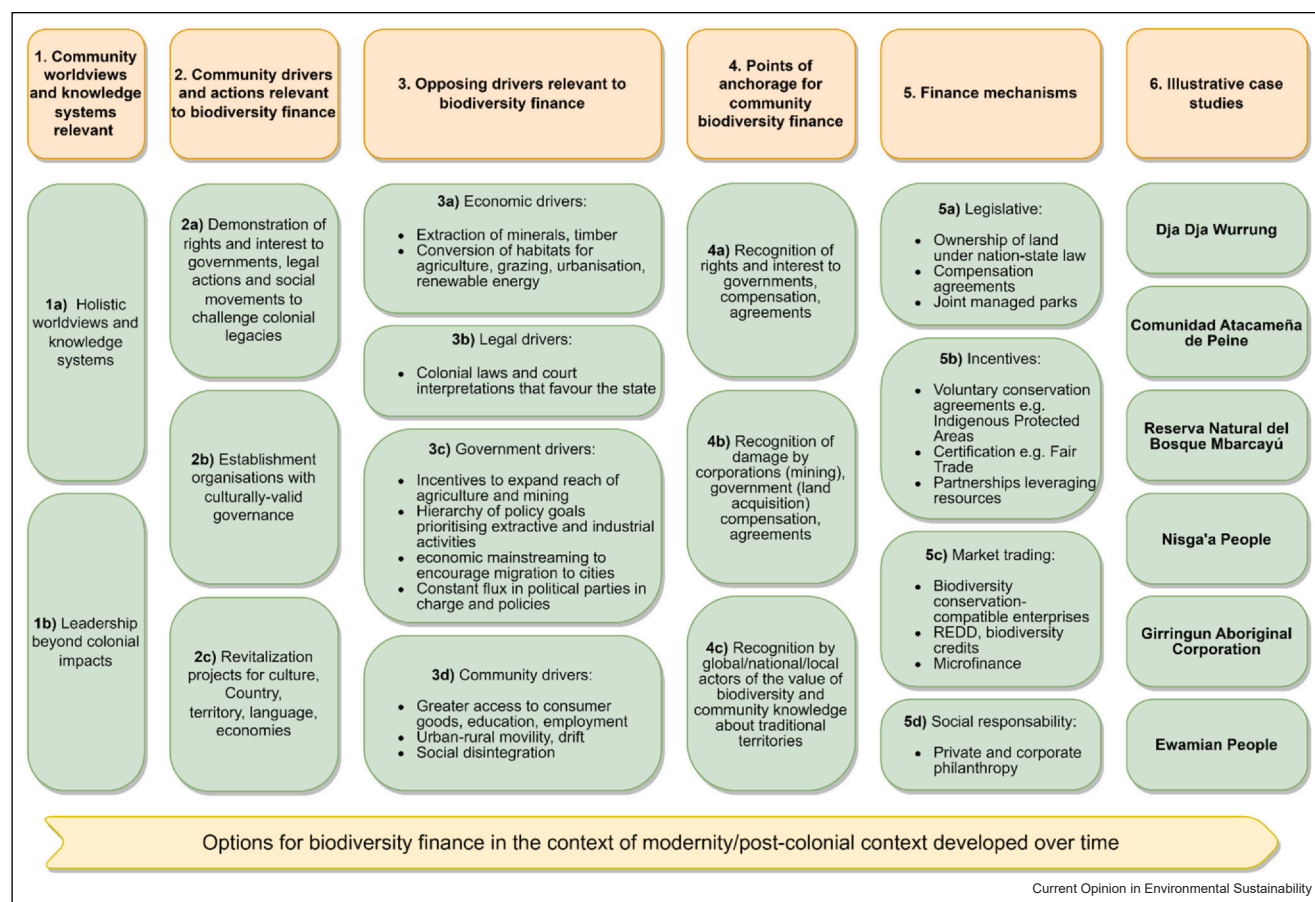
Communities' approaches for biodiversity finance are contextualized by holistic worldviews that link cultures and economies and by leadership to transform futures

beyond colonial impacts (Figure 1,1a,1b). Worldviews that enshrine people–nature connections as kinship underpin institutions founded on accumulated inter-generational knowledge of traditional territories and obligations to protect plants, animals, and places that hold stories and sacred significance [11,12]. Colonization has disrupted these institutions, suppressing the languages, cultural practices, and connections to traditional territories of many IPs & LCs, leading to disproportionate burdens of ill health and socioeconomic disadvantage [13]. IPs & LCs show extraordinary leadership to transform governance toward self-determined futures beyond the 'Colonialcene' [14].

Community drivers and actions relevant to biodiversity finance

IPs & LCs drive biodiversity finance through demonstration of their rights, establishment of organizations, and development of plans and projects [15,16] to revitalize territories (Figures 1,2a–2c). Their social movements and legal actions demonstrate their rights [17], oppose and seek remedy for the damage incurred

Figure 1



Typology of community-based biodiversity finance.

Table 1

Illustrative case studies.

1. Community world views and knowledge	2. Community drivers & actions	3. Opposing drivers & actions	4. Points of anchorage	5. Finance mechanisms
1a) <i>Holistic worldviews</i> “Sustainable economic, cultural, community and environmental outcomes for Ewamian People and Country” 1b) <i>Leadership of futures beyond colonial impacts</i> In Peine, “We are against those who want to harm us, especially the mining and sanitation companies that take away our water and endanger our subsistence and ways of life”.	2a) <i>Demonstration of rights</i> The Dja Dja Wurrung joined with other groups to successfully lobby government to create the <i>Traditional Owner Settlement Act 2010</i>, providing recognition of rights through agreement making. 2b) <i>Establishment of organizations</i> Nine tribal groups in north-eastern Australia established Giringun Aboriginal Corporation in 1996 with culturally valid governance, including a Board with Directors from each group. 2c) <i>Revitalization projects</i> Aché Kuetuy partners with Guayaki to produce yerba mate under the rainforest cover, regenerating the land and enabling cultural heritage protection and economic empowerment.	3a) <i>Economic</i> Aché Kuetuy in Mbaracayú Reserve contend with illegal clearing and logging by low-income settlers. 3b) <i>Legal</i> The ongoing colonial land title systems in Victoria are limited in capacity to accommodate DJAARA’s landscape-wide ecological restoration aspirations. 3c) <i>Government</i> Uncertainty of government funding streams, and changing policies, hinder Ewamian people’s efforts to manage and restore biodiversity. 3d) <i>Community</i> Nisga’a Lisims Government engages heavily in the mine-dominated economy, which generates finance while driving social issues.	4a) <i>Recognition of rights</i> Dja Dja Wurrung achieved the <i>Recognition and Settlement Agreement 2013</i> with the Victorian Government, which included land, funds, and agreements for biodiversity protection. 4b) <i>Recognition of damage through colonization</i> Peine community reached a <i>Conciliation Agreement 2019</i> with a mining company over damage to their traditional lands, including funding to restore habitat for the Andean Flamingo. 4c) <i>Recognition of valuable biodiversity and knowledge systems</i> Giringun negotiated the first Traditional Use of Marine Resources providing funding for marine management based on their knowledge.	5a) <i>Legislation</i>. Victorian Government funds ongoing management of the Joint Managed Dja Dja Wurrung protected areas. 5b) <i>Incentives</i>. Ewamian and Giringun have entered into incentive-based voluntary agreements with the Australian Government to manage lands as Indigenous Protected areas. 5c) <i>Market trading</i> Giringun has established a Biodiversity and Nature Plant Nursery and Art Centre, which generates biodiversity-compatible incomes. 5d) <i>Philanthropy</i> International context of Mbaracayú Reserve as a UNESCO Biosphere Reserve has enabled funding from the World Bank and the Global Environment Facility.

through colonization [18], and highlight the value of their knowledge and territories to global biodiversity conservation [19]. Establishment of organizations with culturally valid governance, that also meet requirements of the nation-state, is essential to enable self-determined leadership that heals colonial legacies [20]. Such organizations, grounded in accountability to their communities, drive revitalization of culture and connections with traditional territories, strengthen language, restore environmental and social conditions, and generate sustainable economies that uplift socioeconomic and health outcomes [20,21].

Opposing drivers undermining biodiversity finance

Communities, both IPs and LCs, must overcome multiple economic, legal, government, and community drivers opposing their strategies (Figure 1, 3a–3d). Extractive and industrial developments are powerful opponents — Indigenous Peoples are negatively impacted by at least 34% of documented environmental conflicts worldwide, with nearly 60% of their lands threatened by urban expansion, mining, agriculture, and energy projects [22,23]. In Latin America, low-income populations are driven to settle in Indigenous territories for agricultural and urban expansion [35–37]. Government policies drive industrial expansion — for example, in 2021, global agricultural subsidies exceeded US\$635 billion per year, more than 60% of which distort producers' decisions and lead to harmful environmental and economic impacts [24]. Governments prioritize economic goals over biodiversity, human health, and social goals [25].

IPs & LCs increasingly engage with capitalist markets and acquire consumer goods and services that are integrated into self-determined economies [26,27]. Limited options in the face of such demand can drive clearing of native habitat for cash crops, for example, in the remote Amazon [28]. The trauma of colonization drives cycles of violence, substance abuse, and mental illness that can drive youth to seek opportunities elsewhere and challenge community efforts toward self-determined futures [29–32].

Points of anchorage for community biodiversity finance

Communities that pursue biodiversity finance within their holistic agendas typically anchor their strategies on recognition (and implementation) of rights, and/or compensation for damage and loss, and/or recognition of the value of their biodiversity and associated community knowledge (Figure 1, 4a–c). Government's recognition of rights to territories, usually after lengthy legal battles, has grown since the United Nations Declarations on the Rights of Indigenous Peoples (2008) and the Rights of Peasants (2018) [33,34]. Legal actions over damage, for example, from mining, provide significant resources to community agendas [35,36]. Global biodiversity

initiatives, including the Kunming-Montreal Global Biodiversity Framework [37], have highlighted the value of traditional territories and the knowledge of traditional custodians, initiating a range of financing opportunities [38].

Biodiversity finance mechanisms

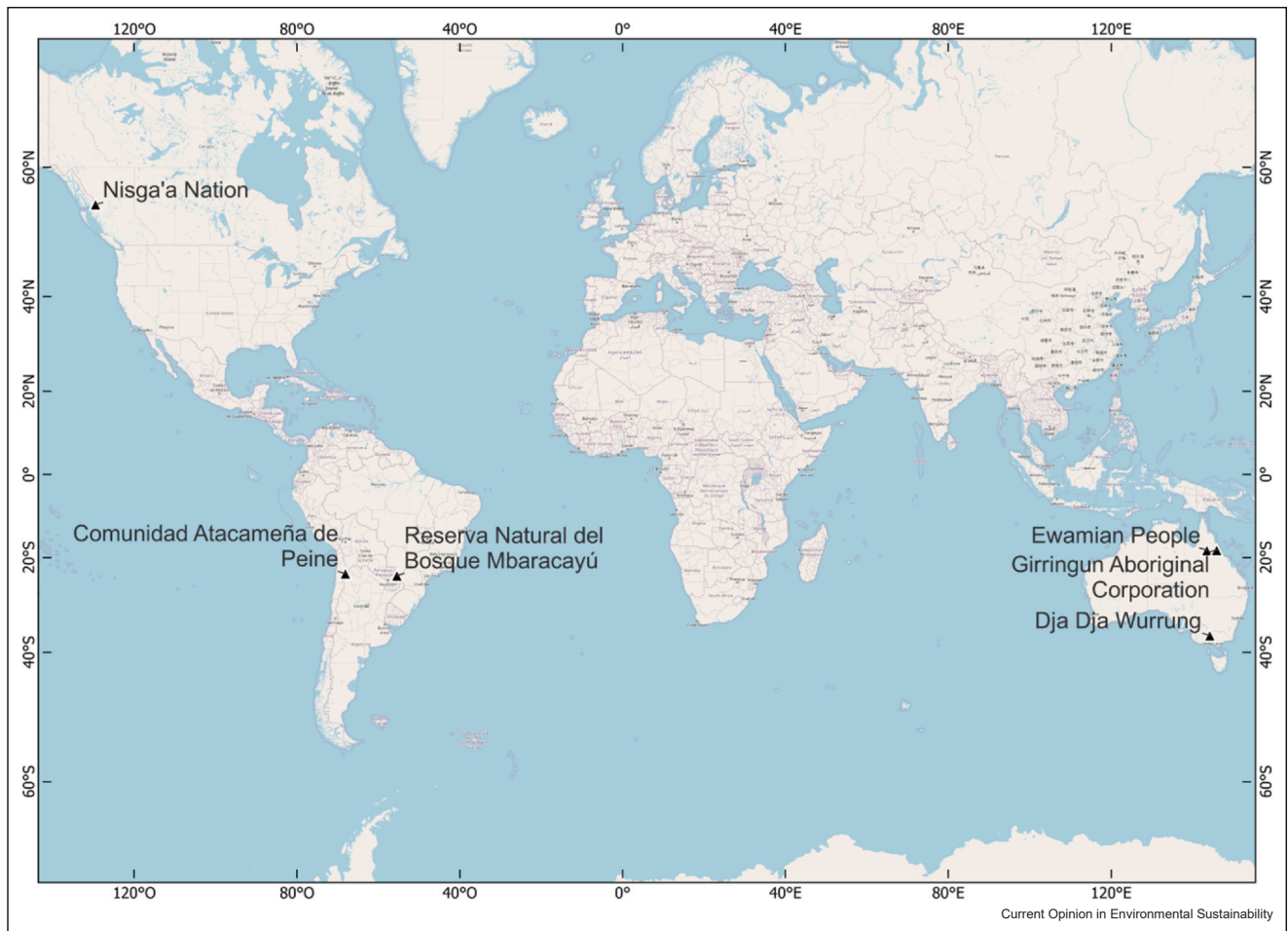
These key anchor points in turn deliver a range of finance mechanisms based on legislation, incentives, market trading, and social responsibility (Figure 1, 5a–e). Recognition of territorial rights often results in new legislation to regulate tenure such as the *Native Title Act 1993* (Commonwealth of Australia) and the *Philippines Republic Act No. 8371 of 1997 (The Indigenous Peoples Rights Act)*. Biodiversity finance is thereby leveraged, for example, through voluntary agreements between communities and governments for community-led management of their territories as protected areas in return for financing [20]. IPs and LCs have negotiated payments via environmental impact bonds [39], nature-based solutions [40,41], and payments for ecosystem services (PES) [42] although these instruments do not appear to replace the need for government finance [43].

Market trading is central to some PES schemes — for example, reducing emissions from deforestation and degradation through trading carbon credits [44]. Culturally grounded enterprises, which can often access green microfinance, ensure economic returns from activities that also protect biodiversity, such as native plant nurseries, businesses based on wild foods, and beekeeping [12,45–47]. Conservation donors see benefit in funding community-based biodiversity efforts as part of social responsibility agendas [48]. A proposal for a global conservation basic income for communities to safeguard biodiversity is attracting increasing attention [49].

Illustrative case studies

Profound connections link culture, economy, environment, identity, and society across all our case studies (see Figure 2, Table 1, and Table S2 for details and sources throughout this section). In Australia, the Ewamian, Dja Dja Wurrung, and Giringun promote visions of linked economic, cultural, social, community, and environmental outcomes, highlighting connections to Country and people. In Latin America, the Peine community enacts ceremonies that link their economic activities through grazing to cultural practices. The Aché people hold their land and its resources as critical parts of their culture and economy. In Canada, the Nisga'a highlight how their lands have sustained their people and their culture, enabling both to thrive, adapt, and endure. All are leading strategies that seek a future beyond the impacts of colonization: for example, the Aché seek to protect their lands from invaders; the Peine oppose especially those who want to harm their waters;

Figure 2



Location of illustrative case studies.

the Dja Dja Wurrung lead healing of their Country from mining, pollution and poor land management.

Demonstration of rights has often led to the creation of government regimes for recognition. In Australia, the Dja Dja Wurrung with other groups successfully lobbied for creation of the *Traditional Owner Settlement Act 2010*; Peine together with other Atacameño groups negotiated *The Indigenous Law 1993*; and the Nisga'a negotiated the first modern Treaty of Canada in 2000. Their organizations invest in culturally valid governance to implement rights: Nisga's Lisims organization governs a modern nation based on the traditional laws and practices of Ayuukhl Nisga'a; nine Aboriginal tribal groups in 1996 established Giringun Aboriginal Corporation; Aché Kuetuvy, who live in the Reserve, coordinate perspectives from the other five associated Aché communities on the Board of the Mbaracayú Reserve communities; and the Ewamian People Aboriginal Corporation Registered Native Title Body Corporate holds native

title in trust for the Ewamian People. These organizations provide the critical foundation — for example, Giringun explains to financiers that investing in people and the relationship between people is the best start to reaching biodiversity outcomes.

Securing territorial rights and safeguarding their territories against drivers of biodiversity — and cultural — loss and degradation is extremely challenging. Aché Kuetuvy in Mbaracayú Reserve contend with illegal clearing and logging by low-income settlers. Ewamian people were forcibly removed from their traditional lands and are now widely scattered, creating difficulties in connecting to Country. Uncertainty of government funding streams and changing policies hinder their biodiversity efforts. The Dja Dja Wurrung have found that the colonial land title systems are unable to accommodate their landscape-wide ecological restoration aspirations. The Peine's traditional territories include significant lithium resources, with mining companies and

governments promoting extraction. Nisga'a Lisims' Government engages heavily in the mine-dominated economy — for example, through investment in mining projects — which generates finance while driving social issues.

The case studies all anchor their biodiversity finance around recognition of their rights, of damage, and of value of their knowledge and biodiversity. Dja Dja Wurrung achieved the first *Recognition and Settlement Agreement* in 2013 with the Victorian Government, with land, funds, and agreements, for example, to jointly manage protected areas on their traditional territories. Peine community in 2019 reached a Conciliation Agreement with a mining company over damage, including funding for ecological reparation work to restore Andean Flamingo habitat. The Nisga'a Treaty provided funding support, including for the development of natural resources such as fisheries. Giringun negotiated the first Traditional Use of Marine Resources Agreement in Australia, with funding for marine management based on their knowledge. Ewamian people were funded by the Australian Government's Indigenous Land Corporation to buy a pastoral lease on their traditional territory. The Aché community supported recognition of the Mbaracayú Reserve as a UNESCO Biosphere Reserve.

From these anchor points, the case study communities deploy multiple instruments for biodiversity finance. The Joint Management legislation of the Dja Dja Wurrung protected areas ensures ongoing government funding for Djaara management, and they have established several biodiversity-compatible enterprises, including DJAKIT Fresh Tucker and DJAARA Timbers, a former salvage operation leveraging growth from the Galk-galk Dhelkunya Forest Garden Strategy [15]. Ewamian and Giringun have entered into incentive-based voluntary agreements with the Australian Government to manage lands as Indigenous Protected Areas. Market mechanisms, such as the Ewamian's Talaroo Hot Springs tourism enterprise, the Giringun Biodiversity and Native Plant Nursery and Arts Centre, generate biodiversity-compatible incomes. The international context of Mbaracayú Reserve as a UNESCO Biosphere Reserve has enabled funding from the World Bank and the Global Environment Facility and an international profile for their tourism ventures. The Nisga'a had an initial cash settlement that supported the development of fishery, forestry enterprises, and their own wildlife management department.

Implications for future biodiversity finance

Communities embed their biodiversity finance within their broader agendas to forge futures based on their rights, knowledge, and values. Strategic investment assists in healing. While beyond the scope of the paper to detail, our case studies showed that multiple co-benefits

accrue from this approach: for example, restoration of traditional harvesting practices increases biodiversity protection, generates cultural capacity, and delivers health and well-being outcomes [50]. The case studies highlight the common features and experiences of communities in Australia, Canada, Paraguay, and Chile in forging long journeys to develop alternative futures beyond the impacts of colonization. Governance grounded in local cultural institutions enables the agency of communities. Biodiversity conservation is one part of their holistic agendas centered on revitalization of rights, culture, and well-being and takes many years to fully flourish.

This finding highlights that global and national actors need to move beyond pathways based on *engaging* communities [51] in biodiversity finance toward ones based on *responding effectively* to community initiatives and path generation. This requires external actors to understand the history and characteristics of pathways that communities are forging and tailor their finance mechanisms to suit the readiness of communities — e.g. toward rights recognition or organizational development rather than PES for those in early stages of their path generation. Timing is critical, and a good fit between communities and biodiversity finance opportunities requires long-term partnerships based on mutual understanding and respect. Further research is needed to identify how inclusive conversations between external biodiversity finance actors and community partners can result in effective networks that overcome the risks of replicating the colonial relationships of power and domination [52]. More knowledge and tests of practice are needed about how biodiversity finance partnerships can respect place-specific world views, knowledge systems, and agency while enabling community-led strategies and pathways for biodiversity management.

Data Availability

All data on which the illustrative case studies are based is provided as sources in the Supplementary File. The remainder of the paper is based on literature review.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.cosust.2025.101521](https://doi.org/10.1016/j.cosust.2025.101521).

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