

Perspective

Globalization and Biodiversity Conservation Problems: Polycentric REDD+ Solutions

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Abstract: Protected areas are considered the cornerstone of biodiversity conservation, but face multiple problems in delivering this core objective. The growing trend of framing biodiversity and protected area values in terms of ecosystem services and human well-being may not always lead to biodiversity conservation. Although globalization is often spoken about in terms of its adverse effects to the environment and biodiversity, it also heralds unprecedented and previously inaccessible opportunities linked to ecosystem services. Biodiversity and related ecosystem services are amongst the common goods hardest hit by globalization. Yet, interconnectedness between people, institutions, and governments offers a great chance for globalization to play a role in ameliorating some of the negative impacts. Employing a polycentric governance approach to overcome the free-rider problem of unsustainable use of common goods, we argue here that REDD+, the United Nations Framework Convention on Climate Change (UNFCCC) climate change mitigation scheme, could be harnessed to boost biodiversity conservation in the face of increasing globalization, both within classic and novel protected areas. We believe this offers a timely example of how an increasingly globalized world connects hitherto isolated peoples, with the ability to channel feelings and forces for biodiversity conservation. Through the global voluntary carbon market, REDD+ can enable and empower, on the one hand, rural communities in developing countries contribute to mitigation of a global problem, and on the other, individuals or societies in the West to help save species they may never see, yet feel emotionally connected to.

Keywords: carbon finance; global commons; jurisdictional; nested approaches; public goods

1. Globalization, Biodiversity, and Protected Areas

Globalization can be a confusing term because it typically represents several different processes occurring simultaneously across the world. Perhaps its most universal notion is that of allowing goods, ideas, capital and to some extent people to move more freely, but not necessarily equally, between countries [1,2]. The process of integration and interaction among people, organizations, institutions, and governments of different nations, largely driven by cheaper or better coverage and penetration of Internet connectivity and increasing accessibility and affordability of modern transport is unprecedented. This is also supported by other enablers like technology and advancements in international policy. It is even reflected in research, where funding bodies increasingly have calls for consortia involving partners from multiple countries, often prizing collaborations between institutions in the North and South [3].

While globalization can bring much needed innovation, technology, jobs, and other resources to areas where there is scarcity, for the environment and natural resources, the ever-increasing

connectedness comes with an attendant risk of externalizing costs, e.g., related to resource extraction and waste disposal [4]. Positive bends in national environmental Kuznets curves that suggest that as a country grows wealthier it reduces its resource-use intensity, may in fact only reflect externalization to other regions [5,6]. For instance, millions of hectares of agricultural land in developing countries, particularly in sub-Saharan Africa and Latin America, have been sold or leased to help meet the rapidly growing global demand for food and other bio-resources [7,8], with potential ramifications for local communities and the environment [9].

Consequently, globalization has mixed effects on the environment, culture and livelihoods of human and non-human societies around the world [10], and remains a deeply polemic topic. To some, it allows poor countries and/or people to grow economically and raise their standards of living, but others claim that it largely benefits multinational corporations at the expense of local people, cultures, enterprises, and environments due to a lack of adequate structure and controls; for instance, exports of agricultural products have been found to be correlated with forest loss with local consequences [11]. Indeed, globalization is considered as a major driver or enabler of major environmental and biodiversity damage due to increased consumption, production, movement of goods and associated greenhouse gas (GHG) emissions [2,6,12]. To exploit the opportunities presented by globalization for biodiversity conservation, there is a need to understand how it works and how the problems come about, before we can consider where potential solutions may lie.

Protected Areas (PAs)—defined as geographical spaces, recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values [13]—are considered important tools for the conservation of biological diversity, and cornerstones of sustainable development strategies [14]. PAs assume several forms and diverse governance systems (either government/public, private/NGO, communities/indigenous groups or mixture of these), with two categories on the IUCN classification (V and VI) explicitly building in a human element to the protection of biodiversity, including culture, aesthetics and sustainable use [13]. PAs increased by more than 50% between 1990 and 2010 [15], but without a concomitant increase in public funding for their operations [16]. With the realization that PAs are consequently not as effective as they could be, novel means for funding them have been suggested (e.g., [17]). Besides funding, various forms of incentives are required to both directly or indirectly support the biodiversity conservation goals of PAs. This can be directly by improving operations within the PAs themselves, or indirectly by improving connectivity and reducing threats emanating from the landscapes surrounding the PAs.

2. Polycentric Solutions to Common Resource Problems

For globalization to avert some of these associated biodiversity problems, appropriate safeguards are required [12]. Such safeguards can range from secure property rights, better transparency and accountability, effective anti-corruption measures, and participation through free, prior, and informed consent (FPIC) [18,19]; sustainability certification is also growing in popularity, but impacts remains unclear or controversial [20,21]. Nonetheless, implementing these safeguards in some form is becoming an increasingly required and normal way of conducting business across many sectors (e.g., see [22]).

Such safeguards notwithstanding, globalization presents an additional unique problem for biodiversity conservation. The tragedy of the commons principle [23] suggests that common pool resources will almost always be overused in situations where any benefits are gained individually while the costs are shared communally. Natural resources like biodiversity generally fit snugly to this original definition of common pool resources. Overexploitation of fisheries provides a poignant example where scientific work points to clear problems and recommended solutions, yet human institutions seem incapable of implementing such solutions [24]. Amongst other issues, this can be attributed to the tension between individual (often short-term) benefits and group (often long-term) costs [25]. Likewise, when examining a historical microcosm of today's global dilemmas, Jared Diamond mused what the Easter Islanders said as they cut down the last trees, dooming themselves to a canoeless future and consequent extinction: did they say "we'll wait until the others stop" [26]?

In his book *The Logic of Collective Action*, Olson explained how beyond a given group size or number of people involved in a system—from tax payment to natural resource conservation—social links that ensure people work for the common good or fulfil their responsibilities start breaking down [27]. This is an enduring problem for environmental and biodiversity conservation, one that is accentuated by globalization. In his valedictory speech, Robert May [28] showed how cooperative systems—from marmots' sentry to humans' vaccinations—are vulnerable to 'cheating', whereby individuals enjoy the group benefit without incurring the costs. Such 'cheats' prosper in evolutionary terms, which makes it difficult for the cooperative benefits or system to be maintained. Only when such free riders (analogous to social and environmental externalities) are fully accounted for or excluded, will the net benefits of globalization be more uniformly and equitably felt and distributed across group members.

Elinor Ostrom in *Governing the Commons*, methodically laid out an eight-point plan on how to overcome some of these common-pool resource (CPR) problems, based on an extensive analysis of diverse systems [29]. Her eighth point on the eight-point plan specifically addressed CPRs that were part of larger systems where she argued that appropriation, monitoring, enforcement, conflict resolution, and governance activities would need to be organized in multiple layers of nested enterprises. In other words, there is need to design a system that builds responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

For climate change, she argued that single policies adopted only at a global scale were unlikely to generate sufficient trust among citizens, institutions and governments, so that collective action can take place in the inclusive and transparent manner necessary to reduce global warming [30]. She suggested that polycentric governance, founded upon the principle of subsidiarity, provided the potentially viable way to overcome this challenge [31]. It resolves the scale problem since it involves having multiple foci that are consistent with the various levels that decisions are made. It is worth noting here that polycentric governance does not allude to levels of government simply carrying out orders from those at higher levels; it requires a certain level of independence, as well as interdependence between governance institutions and organizations at various levels [32].

3. The Globalization, Biodiversity and REDD+ Nexus

Ecosystem goods and services range from the most tangible ones, like food and fiber, to least tangible and abstract ones, like options and existence values [33]. Because they also occur in a continuum from private to public based on ability to exclude other users, the requirements for their provision and conservation varies significantly, which reflects in the values placed on them [34]. Real or perceived scarcity can be used to partly explain the paradox of valuation, e.g., whereby water is essential but cheap and diamonds non-essential but expensive [35]. In essence, whether someone pays or is willing to pay for a given good or service, is based upon how they believe they benefit from paying for it, and whether they can get away with enjoying the benefit without paying the price [34].

Ecosystem services related to global warming, public forests and biodiversity (both tangible and intangible values), remain very susceptible to overuse. Yet, they also have the greatest potential for showing how polycentric governance might work towards resolving globalization problems associated with free-riding. Towards this, global warming could be considered superior to biodiversity because it more directly completes both sides of the user-provider equation:

- User: I know that I directly contribute to global warming through GHG emissions, e.g., by driving to work every day. For the large part, this is unlike biodiversity conservation whereby most people's contribution to the global biodiversity problem is more indirect, e.g., through externalities across supply chains, and not directly by, say, poaching.
- Provider: Notwithstanding what my neighbour opts to do, because of my direct contribution to the problem, I know that my doing something about it, like driving less or offsetting, also contributes directly to solving a small part of the problem.

Nonetheless, even this does not fully assuage the fear that, because I do not know what my neighbour shall do, assuming they are gaming the system and not reducing their emissions, then there is no point in me doing anything because we will be equally (adversely) affected. This is where the polycentric approach comes in, with multiple scales of active oversight to ensure wide-ranging compliance [30]. One of the avenues by which such a polycentric approach can be implemented to solve some of the globalization-driven biodiversity problems is through the proposed nested REDD+ process (e.g., [36]).

3.1. REDD+ and Biodiversity Conservation

Reduced Emissions from Deforestation and Degradation, Improved Forest Management and Afforestation, Reforestation and Revegetation (collectively referred to as REDD+), is a climate change mitigation scheme under the United Nations Framework Convention on Climate Change (UNFCCC) to help stem destruction of the world's tropical forests, by offering financial incentives to forest-right holders not to cut down trees [37]. It is a quintessential product of globalization, fully relying on actions at the global or regional levels, whether through carbon markets or other forms of global climate financing, to drive solutions at the global, national, and local levels [38]. Besides simply reducing CO₂ emissions, REDD+ also introduces an opportunity for climate financing to enhance biodiversity conservation, secure ecosystem services, and improve rural livelihoods [39]. Various international standards exist to ensure that biodiversity and social impacts are accorded the appropriate importance during implementation of REDD+ projects, at par with the carbon emissions reduction goal [40]. As a caveat, the appropriate regulatory framework is needed to ensure that multiple goals are considered, especially when areas of high biodiversity richness do not align with potential for reducing emissions [41].

Depending on the nature and source of threats, REDD+ operates across the four PA governance typologies mentioned earlier—namely public/government, private/NGO, community/indigenous peoples, and a mix of these. It operates on discrete and defined land units, which may be part of classic PAs (falling in any one of the six IUCN management categories), or other lands which may not fit snugly into these but come under some form of protection and conservation through REDD+ activities. While this can directly enhance biodiversity conservation in designated or gazetted PAs, its major strength perhaps is through indirectly propping these PAs by helping conserve adjacent and surrounding landscapes, which enhances the PA conservation goals through improved movement and connectivity, reduced threats, and expanded habitat for wide-ranging species not easily confined into PAs.

Ensnconced in the expansive Tsavo Conservation Area, the Kasigau Corridor REDD+ Project (KCRP) in SE Kenya offers a good example. The KCRP comprises privately-owned land units classified as group ranches straddled by the Tsavo East and Tsavo West National Parks [42,43]. These group ranches were part of a contiguous ecosystem with the two Tsavo National Parks and hence, although not formally designated as wildlife protection areas, they still remain vital habitat and dispersal areas (including corridors) especially for wide-ranging species such as the African Elephant *Loxodonta africana* and African Wild Dog *Lycan pictus* [44,45]. In this case, the role of the REDD+ project in protecting critical wildlife habitat and corridor is evident, which also improves protection for other species [46].

Global efforts to develop national REDD+ programmes indicate that various countries are designing their programs to deliver positive biodiversity impacts from REDD+. Yet, because most these national programs are still in their infancy, their biodiversity goals, planned conservation actions, and monitoring plans remain relatively unclear. Only a few countries such as the DRC and Costa Rica explicitly indicate their biodiversity goals and actions in their National REDD+ Strategy documents [47]. These countries further build into their national strategies detailed guidance on how their strategies intend to generate positive biodiversity impacts. This is largely through voluntary safeguard frameworks, such as the REDD+ Social and Environmental Standards and multiple-benefit standards designed for forest carbon projects.

3.2. The Polycentric Approach Extends this Nexus

Sub-national or national approaches to REDD+ have been extolled over project-level REDD+, mainly due to the potential for broader accounting of leakage [48]. Yet, project-level approaches confer two key advantages: besides enabling early involvement and experimentation, they allow for wide participation by a cross-section of stakeholders including the private sector. This aligns well with the stated advantages of polycentric approaches to conservation [32]. Fittingly, a nested (polycentric) scheme that combines both national and project level approaches has been deemed the most flexible mechanism towards delivering core REDD+ goals [49,50] (Figure 1).

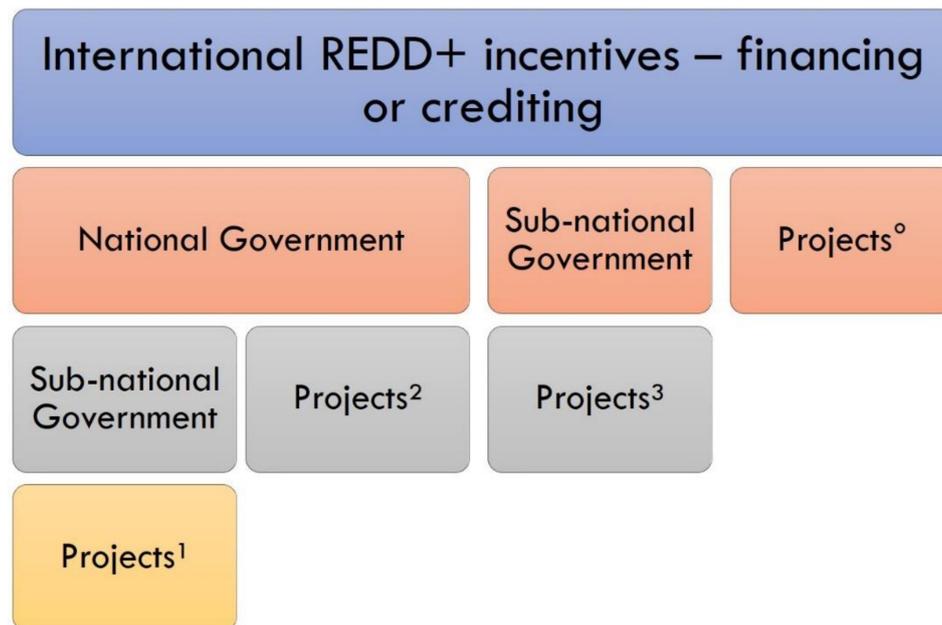


Figure 1. Alternative nesting strategies for capturing and distributing international REDD+ incentives. In the nested approach, rather than going directly to projects (“Projects°”), REDD+ financing passes through either national or sub-national government levels before cascading to projects (Projects^{1,2,3}).

Such systems must carefully combine elements of top-down and bottom-up approaches [51]: top-down to ensure no double-counting and bottom-up to ensure that there is enough incentive to undertake the REDD+ actions required on-the-ground [52]. Nested or polycentric REDD+ helps sidestep potential free-rider problems at both the local and higher levels. First, having independent projects (through any of the four options in Figure 1) at the lowest scales ensures that drivers of deforestation are addressed at source, where it is relatively easy to apply the social pressures and economic incentives needed to ensure comprehensive compliance. Second, when this is linked to a higher jurisdictional level that builds up to the national level (project options 1, 2 & 3, Figure 1), it ensures that jurisdictions and governments also contribute to the process, by formulating and implementing the complementary policy and regulatory instruments needed to stem forest loss and retain the system’s overall integrity [53].

4. Conclusions

While commitments to reduce emissions at the local or national levels will be necessary for coping with the climate change problem, most climate policy is still focused at the global level towards clinching global agreements. Given that international agreements are both difficult to clinch and remain susceptible to free-rider problems, a polycentric approach at various levels with active oversight of local, regional, and national stakeholders could hold greatest promise for success. Nested or polycentric

REDD+ schemes help avert potential free-rider problems by engendering small- to medium-scale action, as well as monitoring and reporting at all levels.

Further, REDD+ has the potential to harness resources for PA management and biodiversity conservation by using the appeal of GHG emissions as a more amenable global commodity. Using carbon to build polycentric policy frameworks and infrastructure could facilitate future development of a similar system for biodiversity. The power of globalization enables a rural farmer in Kenya to play a role in global climate change mitigation, while a social worker in downtown New York can help conserve the elephants in Africa. These persons need never meet, need never directly experience the impacts of climate change or the delight of seeing an elephant in the wild, but their worlds remain intimately connected. Now, thanks to these global schemes, they can begin positively influencing one another for the betterment of all.

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