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Biodiversity in Locally Managed Lands

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Abstract: Decentralizing natural resource management to local people, especially in tropical countries, has become a trend. We review recent evidence for the impacts of decentralization on the biodiversity values of forests and forested landscapes, which encompass most of the biodiversity of the tropics. Few studies document the impact of decentralized management on biodiversity. We conclude that there may be situations where local management is a good option for biodiversity but there are also situations where this is not the case. We advocate increased research to document the impact of local management on biodiversity. We also argue that locally managed forests should be seen as components of landscapes where governance arrangements favor the achievement of a balance between the local livelihood values and the global public goods values of forests.

Keywords: biodiversity; forest landscapes; local management; public goods; livelihoods

Human societies constantly make decisions that lead to the loss of biodiversity. The Convention for the Conservation of Biological Diversity in its "ecosystem principles" recognizes that biodiversity conservation is a matter of societal choice. Some societies may choose to forego economic benefits in order to protect rare species, while other societies may choose to maximize growth. Governments can legislate to place severe restrictions on any actions that endanger biological diversity but another democratically elected government, even in the same country, may choose to lessen these restrictions. The Trump regime in the USA is revoking strict laws protecting biodiversity in order to favor job creation. There is widely held acceptance that it will not be possible to conserve all biodiversity in a world populated by 9.5 billion people, most of whom aspire to extravagant levels of material consumption. Societies in effect make choices about how much biodiversity to conserve and how to achieve this. Unfortunately, most of these choices are made on the basis of weak evidence and are driven by emotions and short-term material needs.

Tropical forests are amongst the most species-rich ecosystems on the planet and any management interventions have impacts on biodiversity. When we choose to harvest timber from a forest, we change the species composition of that forest and possibly cause some species to be lost. When a forest is designated as a protected area, we may interrupt natural cycles of fire and ecological succession and have long-term impacts on the species composition of the forest. Clearing a forest for oil palm obviously reduces species diversity. Modern societies take many actions that change the ecological processes of tropical forests and lead to changes in their species composition. The loss of biodiversity that results from all these interventions in tropical forests is widely regarded as a major global environmental challenge [1].

The special issue of *Land* entitled "Biodiversity in Locally Managed Lands" is a response to a recent move to decentralize forest management and conservation to local communities and local governments. The past decade has seen a powerful tendency to pass control of forests and forested landscapes from central government authorities to administrations at more local scales. There has

been a rapid expansion of indigenous reserves, community forests, protected landscapes, managed resource areas, and other forms of local management systems that apply at sub-national scales [2,3]. In Indonesia, for example, these might be provinces, districts within provinces, or regencies within districts. We define local involvement as the input to decisions on the use, including conservation, of natural resources by the people who live in and utilize a particular forest or landscape for their livelihoods. These local people come from a variety of different backgrounds and represent a variety of different views on what management outcomes should be. They include men and women, ethnic minorities and majorities, poor people and rich people, people of different religions, and so on. The challenge in managing forests and forested landscapes is to reconcile the heterogeneous array of values that such people hold and find a way forward that most people can agree to [4]. These same issues apply to seascapes, but here we focus on forested landscapes.

The Convention on biological Diversity has adopted the "Aichi Targets" for protected areas, and its member states have set a target of conserving 17% of terrestrial land areas for biodiversity conservation. However, this target is being met not through expansion of national parks and strict nature reserves but by designating many areas where humans practice agriculture and other economic activities as IUCN category V protected areas; protected landscapes and seascapes. Dudley et al. [2] reviewed published information and case studies in an effort to determine the extent to which such areas protect biodiversity. Their evidence is limited and contradictory. Sometimes protected landscapes are apparently better than more strictly protected areas, sometimes they are worse, and sometimes they are just the same. The difficulty in pinning down sound evidence one way or the other reflects a common thread throughout this special issue: that not enough is currently known to say with any certainty that locally managed areas are better or worse at protecting biodiversity [5]. Context is everything.

The impetus for decentralized management is coming largely from civil society organizations whose mandate is to champion the rights of local and indigenous communities [5,6]. We have encountered numerous examples of community organizations who claim that local management provides the best option for conserving biodiversity, but we have found very few scientific studies in the peer-reviewed literature that substantiate these claims. The evidence available is unclear and can be contradictory [2,7]. The objective of this special issue is emphatically not to take a position opposing local forest management. There are many excellent reasons why local people should have major decision-making power over their forests. There are numerous examples of local people who have managed forests and agroforests sustainably for generations but who have been deprived of their resources by corporate land grabs. Local self-determination, especially of the many poor people who live in, and depend upon, tropical forests, should take precedence over rather abstract global biodiversity goals. There are many situations where local management may provide better prospects for biodiversity than any of the likely alternative management options for a forest, but there is little concrete evidence that this is the case.

We simply do not know in most cases what will happen to biodiversity when forests are handed over to local communities or their local governments. The local context will drive outcomes. Governance arrangements, the functions of institutions, powerful local individuals, and the extent to which ethnic minorities are recognized all play significant roles. There are few examples of locally managed forests being subjected to the scientific monitoring that would provide evidence on the fate of biodiversity. Galbraith et al. [8] ask if engaging local communities in project management, a form of citizen science, leads to enduring support for ecological restoration, the control of invasive species, or the protection of native biodiversity in New Zealand. They found that of 50 local groups participating in such projects, none identified strategic milestones or measures of progress towards biodiversity goals. They suggest that improved training, more technical support, and institutional collaboration are all needed to move such local groups towards a more genuine citizen science capability.

We argue that the move to shift control of forests to more local levels must be accompanied by greatly expanded efforts to conduct inventories of biodiversity in these areas and to monitor the

impacts of local management strategies on biodiversity. Fujiki et al. [9] describe a method for predicting tree community composition, an indicator of forest intactness that could be used to monitor progress towards the achievement of the Aichi targets. It might also be used to monitor the effects of different management practices at a more local level. Thackway and Freudenberger [10], using examples from Australia, show that the vegetation condition is an emergent property, not only of environmental conditions, but importantly also of markets, technology, history of settlement, and infrastructure development, government policies and programs, and individual and community values, and how all of this is constantly changing over time. They propose a simple graphical report showing drivers of change and trends against a benchmark state, which might be appropriate for monitoring local management practices. It is also a strong argument for strengthening multi-sectoral governance because institutions, powerful individuals, and politics have a profound impact on the fate of biodiversity. If community-managed areas do prove to be significant for biodiversity conservation, then the values that communities provide to broader society through their conservation actions may merit them being rewarded by significant payments for environmental services. If such win–win outcomes are to be realized, then we will need to greatly expand our investments in documenting the biodiversity values of locally managed areas. Changes in biodiversity in locally managed areas will have to be carefully monitored to enable management to be adapted to achieve specific biodiversity outcomes.

In the right circumstances, locally managed lands can clearly make significant contributions to the conservation of biodiversity. Mukul et al. [11] measured the conservation value of four local agroforestry land uses and the forest itself, in and around a protected forest in Bangladesh. They found that agroforestry can complement the protected area. Betel leaf agroforestry protects more biodiversity than pineapple or lemon agroforestry, which in turn are better than shifting agriculture with fallow. Thus, local agroforestry management does contribute to regional biodiversity. However, caution is required. Velho et al. [12] found that, while many native species are present in the locally managed lands adjacent to three protected areas in Northeast India, the larger mammals were generally absent, being restricted to the protected areas. There is clearly a role for locally managed lands in protecting regional biodiversity, but they complement protected areas—they do not substitute for them.

There are numerous examples of communities causing losses to biodiversity. Communities often derive few instrumental benefits from conserving biodiversity and often incur significant costs [13]. Terborgh et al. [3] provide evidence of the loss of keystone species in areas under local management, which leads to cascading impacts on tree diversity. They were not surprised by this, pointing to the fact that people who have lived more or less isolated from world markets have recently become connected to them and now aspire to become modern consumers enjoying the benefits of modern technology, just like the rest of us. In the same vein, we should not be surprised to find that local management priorities are not necessarily aligned with public good outcomes like the protection of biodiversity [6]. Boedhihartono [5] shows that even relatively remote and isolated communities in Indonesia's forests have little incentive to conserve all components of biodiversity. Short-term improvements in livelihoods tend to be prioritized over more abstract long-term biodiversity outcomes. Langston et al. [14] found that forests on the frontier of estate crop plantations in West Kalimantan, Indonesian Borneo, that are still managed locally are coming under increasing pressure. Poverty and aspirations to participate in the cash economy are driving change away from traditional local management practices. Mosaics of different land uses from protection to intensive cultivation and multi-sectoral coordinated governance that such landscapes would require are suggested as possible ways forward.

Advocates of local management should also be more realistic about the long-term sustainability of these systems. Populations are growing, people are more connected to the outside world, and they are better informed about the material benefits that come with economic growth. In a world of 9.5 million people, there will only be few who choose to subsist from hunting and gathering or even by harvesting non-timber products from agroforests. Handing over control of forests to such isolated peoples today may enable them to navigate their transition to a market economy in the future more easily and without losing their main capital asset—their land. However, it seems unlikely that local

management alone will provide for the security and prosperity that most of the rural poor have as their preferred long-term objective.

Local involvement in management of natural resources is incontestably desirable and has been under-valued in forest and land conservation strategies in the past. However, local management is not a panacea [15]. Local communities should be central to all decision-making on land allocation, but measures need to be taken to conserve the public goods values of forests—values that accrue to non-local stakeholders. Governance systems that recognize local values must be developed [16]. One of the problems of international initiatives to favor local management is that they often fail to accord with the realities of local governance, which can be complex and, as noted above, multi-sectoral. Hodge et al. [17] contrast short-term project outcomes with longer-term strategies that promote adaptive multi-sectoral governance. Both have their strengths but the second is needed for lasting change because, among other things, it necessarily requires the participation of local communities. Short-term projects are often insufficiently informed by local contexts [18]. Landscape approaches provide one way to ensure that local interests are fully incorporated into decision-making on forest lands [19] and theories of change can ensure that learning and adaptation can enable local interests and global biodiversity goals to be reconciled [4].

The history of forest conservation has been rich with silver-bullet solutions imposed from outside. Many of these solutions have failed because they were not embedded in local realities. Local involvement in forest management and local control of a proportion of all forests is essential if sustainable outcomes that improve local livelihoods and protect biodiversity are to be achieved. Local management has to be an important component of future efforts to conserve forest biodiversity, but it has to be part of a much broader suite of approaches that ensure that the full range of forest values are managed in ways that meet the needs of the broader societies that have legitimate interests in the maintenance of forest values. Local management should not be seen as replacing the need for conventional, strictly protected areas. Instead, locally managed forests should be seen as significant components of multi-functional landscapes that achieve a balance between meeting livelihood needs of local people and safeguarding the public goods values of forests for the benefit of the broader community.

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