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Can Community Forests Be Compatible With Biodiversity Conservation in Indonesia?

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Abstract: Forest lands in Indonesia are classified as state lands and subject to management under agreements allocated by the Ministry of Environment and Forestry. There has been a long-standing tension between the ministry and local communities who argue that they have traditionally managed large areas of forest and should be allowed to continue to do so. A series of recent legal and administrative decisions are now paving the way for the allocation of forests to local communities. There is a hypothesis that the communities will protect the forests against industrial conversion and that they will also conserve biodiversity. This hypothesis needs to be closely examined. Conservation of biodiversity and management for local benefits are two different and potentially conflicting objectives. This paper reviews examples of forests managed by local communities in Indonesia and concludes that there is very limited information available on the conservation of natural biodiversity in these forests. I conclude that more information is needed on the status of biodiversity in community managed forests. When forests are allocated for local management, special measures need to be in place to ensure that biodiversity values are monitored and maintained.

Keywords: community forest management; biodiversity conservation; indigenous forest management; community conservation; Indonesian forests

1. Introduction

Indonesia is experiencing major changes in land allocation and tenure systems, especially in relation to forests [1]. The Constitutional Court decision No.35/PUU-X/2012 announced in 2013 was a historical landmark recognizing indigenous people's rights over their traditional forests. Until this decision was taken most natural forests were legally under state jurisdiction. The 1945 Indonesian Constitution, Article 33, declares that the State has control over all earth, water, and airspace [2]. The Constitutional Court decision No.35/PUU-X/2012 was consistent with the Rio+20 declaration on environment and development, which recognized that indigenous customary law has a vital role to play in environmental management and development because it is inspired by traditional knowledge and practices. Recent statements by the Minister of Environment and Forestry have indicated that up to 30% of Indonesia's forests could be transferred or returned to local community ownership.

AMAN (*Aliansi Masyarakat Adat Nusantara*) or the Indigenous Peoples' Alliance of the Archipelago and other non-governmental human rights organizations operating in Indonesia consider the Constitutional Court decision to be an entry point for restitution of customary rights over indigenous territories, especially indigenous forests. There are numerous *masyarakat adat* (communities that still practice traditional customary law) all over Indonesia who will now be entitled to claim that they are "indigenous" and may exploit the constitutional court ruling to obtain the release of their customary forests from designation as state forest. However, the constitutional court ruling requires that indigenous peoples be recognized by local regulations. In order to obtain this status the communities

have to demonstrate that they are part of a *masyarakat adat* in their daily lives. A parallel movement is seeking acknowledgement of '*wilayah adat*' (indigenous territories) as an additional form of agrarian right residing in a separate legal arrangement [3]. When the concept of customary rights (*hak ulayat*) is being discussed as part of new regulations made by the Land Management Agency (*BPN*), each *wilayah adat* would be subject to different conditions and interpretations of rights. Customary land, with customary rights is an abstract concept describing the authority of a society and the range of customary law that applies. Indigenous territories would include land, water, air, and the customary rights attached to them. We need to understand the richness of culture and communal rights in Indonesia, but also recognize the variation amongst different communities sharing the same landscape.

The movement towards indigenous forest control has been driven by concern that corporate land grabs, especially by estate crop companies, are depriving people of their forests and land. There is a widely held view that the Ministry of Environment and Forestry has failed to protect forests against corporate interests. Laws to prevent forest clearance are weakly enforced or are blatantly ignored by elites and government patronage systems. The provision of local rights is expected to strengthen the hand of local people in defending their forests. There are moves to allocate both collective rights and private individual rights to forest lands.

The issue of collective rights or individual rights has been the object of significant discussions in many countries. The tension between collective rights and individual rights is often manifest during processes of political decentralization and attribution of local autonomy [4]. There are differing views on whether individuals are more likely to protect their forests than communities. In some cases individuals simply sell their land, whereas under community tenure this is much less likely. Brosius et al. [4] discuss the consequences of recognizing community autonomy. Brosius has observed that "When 'natives' become privileged, are other social groups marginalized? What space is there for mobility, migration, and the movements of both rural and urban poor?"

This paper is motivated by concern that the process of attributing both local communal rights and private rights is moving ahead rapidly and that adequate checks and balances to ensure forest values are protected, are not in place. Claims in the international policy discourse that biodiversity outcomes in community managed forests are superior to those of state managed protected areas may be true, but are rarely supported by evidence. Local elites can be as corrupt as the central government [5,6]. In this study, I report on observations in many parts of Indonesia over three decades of field work where I have observed the different conditions under which local people exercise protection of forest lands. My observations are that there is a very high level of diversity in local conditions and that proceeding on the assumption that "one size fits all" in local forest management is a mistake. Opportunities and threats to forests are highly context specific and a greater diversity of approaches to localizing forest management is needed. I will focus particularly on the implications of the current wave of decentralization for the conservation of Indonesia's unique biodiversity.

The issue of community forest management in Indonesia has been somewhat confused by a general failure in policy circles to distinguish between agro-forests that have been under de facto local management for generations, and more remote near-natural forests that have only been lightly exploited for non-timber products by local communities. Very extensive areas of forest in Indonesia, especially in the Greater Sunda Islands, have been progressively enriched with fruit, resin, and timber tree species over long periods of time [7,8]. These heavily modified forests have often been viewed by outsiders as natural forests and were often classified by the Ministry of Forestry as production or protection forests. Government classification restricted the use of the forests by traditional owners, and this led to tensions between these communities and the Ministry of Forestry. On 30 December 2016, President Joko Widodo announced that 12.7 million ha of forests would be allocated to local communities. He announced a decree giving "Recognition of Customary Forests" to nine Customary Communities (*Masyarakat Hukum Adat*) located in Sumatra, Java, and Sulawesi. What is unclear is whether these nine community forests and the 12.7 million ha proposed for future allocation to

communities are predominantly in heavily influenced agro-forests, or whether they include more natural forests in remoter areas.

The President stated that "conservation forests whose status has changed into customary forests or rights forests, must maintain the function of conservation. It is not permitted to be traded and it should not change its function" [9]

2. Why Do We Need Biodiversity Conservation?

Before discussing whether local communities will be effective in conserving forests, I would like to discuss why societies care about biodiversity. Ehrlich and Wilson [10] postulate three reasons: "Firstly for ethical and aesthetic values, as *Homo sapiens* we have the moral responsibility to protect living companions in the universe; second to perpetuate the enormous direct benefits that people derive from biodiversity in the form of foods, medicines, industrial products, crops; third to keep natural ecosystems functioning when diverse species are key working parts of ecosystems. Biodiversity plays a critical role in ecosystem services". However, some traditional and indigenous peoples might find Ehrlich and Wilson's arguments somewhat irrelevant to their own realities—the rural poor might focus on the instrumental values that they derive from biodiversity. If we ask an elder or an indigenous person why they care about biodiversity, they will probably talk about medicinal plants, the flowers, and the fruits they use in rituals, the birds and other animals they encounter in the forests which they use in ceremonies to contact the spiritual world, and they would also value the biodiversity that contributes to their diets. Tribes living in the forests on their ancestral land regard biodiversity as contributing an integral role in the survival and sustainability of the forest ecosystem and its wildlife [11]. Traditional societies worship spirits, gods and goddesses, sacred sites, and sacred forests. Traditional people have a symbiotic relationship with nature. Traditional ecological knowledge is embedded in the complexity of peoples' lives. Local cultures and their institutions have rules, taboos, sanctions, rituals, and ceremonies, and make sacrifices which have significance for them. Respect, reciprocity, and humility are cultural values which are part of social mechanisms underpinning traditional practices. Traditional knowledge and practices are central to local systems of management that in many situations can still work sustainably in contemporary societies [12]. Traditional practices operate within complex systems which are continuously changing. As the world's population grows, people's cultures and ways of life are evolving. Development is increasing pressure on natural resources systems. Management systems have to adapt to these changing contexts, and maintaining the biological diversity that underpins the systems and their management becomes more important. These local concepts and values of biodiversity may differ significantly from the values of biodiversity held by international conservation organizations, values that are enshrined in the clauses of the Convention for the Conservation of Biological Diversity.

Environmental concerns are now central to political agendas around the world. Global mechanisms are emerging to avoid environmental degradation and to protect habitats and endangered species of plants and animals. Environmental conservation is now prominent in development strategies. We require nature to be an essential element of development [13].

Some conservation organizations have been portrayed as giving nature conservation priority over indigenous rights to self-determination [14–16]. A generation of international and national Non-Governmental Organizations (NGOs) are now seeking participation of communities in managing their forest areas and other natural resources [16,17]. Landscape approaches have emerged to provide a mechanism for balancing the interests of diverse stakeholders in managing forests and other natural resources [18], and these integrated approaches have clear relevance to local forest management.

I contend that more attention needs to be given to questions of why we conserve biodiversity. What do we wish to conserve and for whom [19]? The people who will feel the impact of conservation programs need to be involved in designing and operating them, otherwise they are unlikely to value or support them. However, merely participating in conservation programs is clearly not enough. Conservation programs have to confront the real interests and values of the communities that they

impact upon. Conservation interventions can result in some winners and some losers—we need to understand who will lose and who will gain, and to put in place mechanisms to ensure equity in these processes.

For all of these reasons, community based conservation is not a simple recipe that can be applied indiscriminately in any location. Local contexts are highly diverse and societies are very heterogeneous. In any situation there will inevitably be inequitable distribution of rights and responsibilities for natural resources. We need to be critical in assessing "who actually conserves" and what do they conserve against? Berkes et al. [20] points out that "our definition of conservation is western-centric". Community-based conservation programs have to recognize the diversity of the communities that they deal with and what it means to the local beneficiaries. Kumar [21] has observed that "Community-based conservation is here to stay. The question is how a community's involvement can be made effective. Protection of biodiversity must be based on a wide range of approaches in order to develop a shared understanding of compatible conservation and development goals at various levels in societies" [21].

3. Landscapes in Transition-Development and Decentralization

Indonesia and other developing countries have rapidly expanding economies. The populations of these countries are growing and this is placing more pressure on natural resources and forests. Some Pacific islands [13] have demonstrated stark conflicts between economic development and traditional values. Communal well-being has been in conflict with individual ambition. The transition from a subsistence system to a cash economy has created deep tensions.

Clarke et al. [13] noted that "These communities developed sustained-yield systems of agriculture, agroforestry, and reef use that still operate productively today, but are in danger of disappearing in the face of changing technological, social, and economic conditions." I have observed exactly these same tensions in rural Indonesia as the country undergoes unprecedented levels of integration with the global economy.

Diamond et al. [22] dismissed the notion that pre-industrial societies lived in harmony with nature and discussed "The Environmentalist Myth". When the carrying capacity of an island or an area has been exceeded then civilizations collapsed. The rising global population threatens ecosystems, and harmony between biodiversity and people is difficult to achieve. Again, in forest areas of Indonesia I have observed exemplary practices by indigenous communities in managing nature, but I have also seen cases of flagrant disregard for sustainability by people pursuing their individual interests.

There is a diversity of conservation behavior amongst traditional societies, and nowhere is this greater than in Indonesia. Chapman et al. [23] has argued that "there is an urgent need to improve understanding of conservation attitudes in the Third World because of the increasing rate of resource depletion that is now occurring in the countries involved". Chapman et al. [23] has argued that whilst "conservation practices by traditional societies have received much attention from research workers, the fact that some practices are intentional and others inadvertent has been largely ignored". In the popular discourse on local forest management in Indonesia there is recognition of this diversity, but there are few empirical studies of how this diversity of management systems operates in the forest.

Duncan et al. [24] examined the growing numbers of NGOs and other institutions in Indonesia engaging with indigenous rights movements in the hope that decentralization processes would allow ethnic minorities to retain or regain control over natural resources through local-level political initiatives. Some ethnic minorities see decentralization as an opportunity to return to local land tenure customs and resource management systems that were opposed by the national government during the Soeharto era. However, the decentralization process has encouraged district governments to over-exploit natural resources in an attempt to generate more income for their district. Minority communities have sometimes suffered negative consequences from decentralization processes, as local governments disregard their land rights in attempts to raise income. Local governments often pursued the same rent seeking behavior as the Soeharto Regime [24–26].

Indigenous ethnic minorities in Indonesia are impacted by the implementation of decentralization and regional autonomy policies. Decentralization is supposed to better protect the interests of ethnic minorities and other marginal groups within the state as local communities gain more control over their own affairs [27]. However, others contend that decentralization allows local elites to get more benefits while still excluding ethnic minorities and other vulnerable populations from the political process [28,29], and women's concerns seem to be largely ignored in these debates.

Brosius et al. [4] expressed concern at the proliferation of movements and agendas promoting the "indigenous paradigm" and argued that donor institutions and government agencies need to be careful in assessing claims and counter-claims, and must base their decisions on evidence. The international discourse amongst human rights advocates, international and national NGOs, and other activists may sound compelling, but Brosius suggests a closer examination of the extent to which the advocates of local resource management are actually reflecting local concerns and needs. International and local organizations have been advocating the establishment of Community-Based Natural Resources Management (CBNRM) programs in different parts of the world, but the results are perceived differently by advocates depending on whether they come from a conservation institution, development organization, or they genuinely represent indigenous people.

Local wisdom, traditional knowledge and values of indigenous groups are important when involving communities in natural resources management. However, for many indigenous groups the term conservation is seen as a concept "exclusively for the elites" or westerners. For many indigenous peoples living in poverty, short-term survival is their daily preoccupation. Activists and human rights groups championing indigenous access to forests argue that people have used the forests for their subsistence needs for generations. They accuse conservationists of taking forests to establish protected areas or national parks [14,30]. These processes are unfolding in landscapes that are subject to rapid change. People's needs and expectations are evolving. The dilemmas created by conflicting demands on land need to be resolved through landscape scale processes that allow all stakeholder voices to be heard [31].

4. The Importance of Traditional Knowledge in Conservation

Traditional knowledge, as a way of knowing, is similar to western science in that it is based on an accumulation of observations, but it is different from science in some fundamental ways [12]. Scientists take notes and record data as they seek to understand causal relationship. These studies can be replicated at different times, by different people or in other places. Traditional people accumulate knowledge in a more experiential and informal way—they learn from doing, and over time they will adapt and retain best practices and discard practices that do not serve their purpose. They do not conduct controlled experiments.

Mainstream conservationists have often focused on conserving biodiversity and are sometimes reluctant to accept that indigenous people are part of the landscape where conservation is occurring. Only recently have significant numbers of conservationists switched to the belief that the world's biodiversity is found and will continue to be found in landscapes occupied by people [17].

Brosius et al. [4] stated that: "Community-based natural resource management is imagined differently by different advocates. Conservationists, both indigenous and foreign, hope to involve local people in achieving transnational conservation and resource management goals as a means of protecting biological diversity and habitat integrity" [32–34]. However, the empirical evidence for community based management delivering both local benefits and broader environmental benefits is quite mixed.

Traditional ecological knowledge is defined as a cumulative body of knowledge, practice, and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings, including humans, with one another and with their environment [35]. Traditional ecological knowledge is accumulated over many generations through trial and error. Not every indigenous group has such a body of traditional ecological

knowledge, but many communities do retain a body of such knowledge [35]. My experience in Indonesia reflects this diversity in the retention and value of traditional ecological knowledge. My studies of the Punan in Kalimantan in the 1990s showed significant retention of sophisticated ecological knowledge, but in the decades that have elapsed since that time many Punan have moved to towns and are shifting towards more mainstream livelihood systems [36–38].

Berkes et al. [12] have emphasized that recognition of the importance of traditional ecological knowledge has been growing and it is now widely accepted that such knowledge can contribute to the conservation of biodiversity [39], rare species [40], protected areas [41], ecological processes [42], and to sustainable resource use in general [43]. Berkes et al. [20] again highlighted "the use of local and traditional ecological knowledge as a mechanism for co-management and empowerment". This is true in the case of Indonesia, but again the effectiveness of traditional ecological knowledge systems is highly variable according to where we are in the archipelago.

There are numerous examples where traditional knowledge practices have melded with western ideas of conservation resulting in successful action drawing on ideas from different cultures and producing multi-disciplinary science-based management outcomes [44,45]. Several conservation NGOs have successfully worked with local knowledge systems in Indonesia to achieve conservation outcomes, while other conservation organizations have been less receptive to local perspectives and knowledge.

The system of *adat* (customary law) and religious belief systems clearly has an important role to play in community-based conservation initiatives in Indonesia [21,36,46]. Wadley and Colfer [47] have shown that Iban agroforestry systems and their land use practices may be important for local economic purposes, but they may also be valuable in promoting and enhancing the more global goals of biodiversity conservation. Indigenous peoples with a historical continuity of resource-use practices often possess a broad knowledge base on the behavior of complex ecological systems in their own localities. This knowledge has accumulated through a long series of observations transmitted from generation to generation. Such "diachronic" observations can be of great value and complement the "synchronic" observations on which western science is based [39].

Brosius et al. [48] argues that " ... indigenous k*nowledge* is generally applied to discussions of indigenous understandings of the natural world: systems of classification, how various societies recognize or interpret natural processes, what such groups know about the resources they exploit, and so forth ... ".

Berkes et al. [12,43] again emphasize that "traditional knowledge is a knowledge–practice–belief complex, evolving by adaptive processes and handed down through generations by cultural transmission, it is about the relationship of living beings (including humans) with one another and with their environment". Gadgil et al. [39] argue that traditional ecological knowledge is an attribute of societies with historical continuity in resource use practice. My work with indigenous communities in the remote forests of Indonesia strongly supports these observations.

As the world changes, societies' priorities change. *Adat* traditions and cultures are living systems and they adapt and change. A lot of communities abandon traditional local religions and convert to the major world religions, and young people no longer see the relevance of rituals or ceremonies in their lives [36]. Parents send their children to school in towns. When they finish school they no longer want to become farmers, fisherfolks, or hunter-gatherers. Transfer of knowledge and values changes over time. Throughout Indonesia I observe that many young people are changing, adapting, and revising their traditions and communal values to conform to their new environments.

Dahl et al. [49] has observed that children who are no longer educated in the family or the tribe, but in schools with western-style education, tend to change and adapt cultures to their new way of life. Traditional patterns of social organization for collective action are disrupted, making it difficult to continue group occupations such as collective fishing or the irrigated cultivation of rice or taro. New occupations in towns, mines, or commercial agriculture attract the most able and the people really in need of jobs to fulfil their family needs, and reduce dependence on traditional subsistence

activities. Traditional knowledge no longer passes automatically from parent to child. Even where subsistence activities have continued, new technologies replace old ones and old knowledge seems superfluous or redundant. The technological fix becomes a temptation for all societies.

5. Can Community Conservation work in Indonesia?

Conservation in a landscape or seascape where indigenous or *adat* communities and local communities have strong commitments and strong informal institutions does still work. *Awiq-awiq* and *Sasi* systems are traditional systems of managing natural resources to prevent over-harvesting. *Awiq-awiq* and *Sasi* are still widely respected in the islands of eastern Indonesia. However, local context will determine which approaches to conservation will work in different landscapes or seascapes.

In Indonesia, forests are being given back to local communities to manage. These communities are not static, they are constantly changing. Younger generations are abandoning rural communities to move into cities to have a "better life". They leave in search of salaried employment. They aspire to own cellphones, T-shirts, motorbikes, and many other material benefits that the city offers [38]. The communities that may have traditionally managed the forests may no longer exist in their original form. *Adat* systems are not locked in time, they are evolving in multiple ways, and it cannot be assumed that they will function as they did in the past.

The people left behind in rural villages often remain poor and have to struggle to meet their basic needs. Outside investors provide opportunities, but also pose threats. Conservation of their natural environment may or may not remain important in their livelihoods. There is a deepening gap between the elders who still retain traditional knowledge and values and the younger generation who no longer practice taboos or restrictions on exploitation of forest resources and who aspire to obtain immediate material benefits. Thus, elders' concerns to conserve the environment and the forests resources for their children and grandchildren is there, but more powerful actors now have access to what used to belong to the communities. If local people do not take the forest products, then external actors will. This is a strong disincentive for conservation.

Taboos are often mechanisms for the protection of species and habitats and may work in contemporary society where they complement other social rules and sanctions, rooted in traditional belief systems [43]. Taboos may serve a social function in the management of natural resources, but in Indonesia a lot of traditional societies no longer practice those taboos or restrictions which support biodiversity conservation.

Colding et al. [40] have argued that taboos represent unwritten social rules that regulate human behavior. Such constraints may not only govern human social life, but also may affect, and sometimes even directly manage, many components of the local natural environment. Whatever the reason for such constraints, taboos may, at least locally, play a major role in the conservation of natural resources, species, and ecosystems [23,39,41]. There are critics who view the practice of taboos as irrational and a hindrance toward development [50], who dismiss any ecological reasons behind them [51], or who argue that the taboos may not be adhered to by some groups and, consequently, may be of no value in nature conservation [52]. Numerous situations persist in Indonesia where taboos clearly do continue to serve to protect nature, but the strength of these taboos is declining.

My own observations studying taboos that persist amongst remote communities are consistent with those of Berkes et al. [53] who describe social restraints, such as taboos, that lead to indigenous biological conservation. These restraints include providing total protection to some biological communities, habitat patches, and certain selected species, as well as protection of other species during critical stages of their life history.

The literature on the potential for biodiversity outcomes to be achieved better through the use of traditional knowledge and by placing management responsibility in the hands of local and traditional people is rich and diverse. There are claims and counter-claims often poorly supported by empirical evidence. There are many general assertions used by campaigning groups which fail to recognize the extreme importance of local context in determining approaches that will work. The following

accounts are based upon three decades of field work with different traditional groups in Indonesia and illustrate the complexity of the situation in the field. Figure 1 shows the locations of the *adat* communities discussed.

Figure 1. Locations of the *adat* communities discussed.

6. Examples of *Adat* Communities' Relations with Their Forests

6.1. The Baduy of West Java

The Baduy people of West Java are a community who are still strongly dependent on their *adat* and traditional belief systems and have retained complex land management practices. The Baduy inhabit an area in the mountains of West Java less than 200 Km from Jakarta, the capital of Indonesia. The Baduy have two communities. The "Inner Baduy" wear white garments and are largely isolated from surrounding communities. The "Outer Baduy" wear black garments and have a greater degree of contact with outsiders. The Baduy practice norms and beliefs that are articulated in the form of a code of conduct and they have taboos that mediate their daily behavior. Baduy traditions forbid changes to their landscape and the ecosystem. Therefore, levelling the land to make houses or for irrigation, dams, and waterholes is taboo.

Cosmological beliefs inherited from ancient eras concerning nature and the earth are the main source of Baduy norms, beliefs, and culture. They believe that land and natural resources have a spirit. They glorify their homeland and do not allow anything to disturb the ecosystem. They protect sacred forests where they believe their ancestors reside by offering "sacred" swidden rice to maintain and reinforce their links with their ancestors.

The Baduy have strict codes of conduct with supporting taboos which are implemented in farming, extracting natural resources, and other nature-related activities. To protect their norms, beliefs, culture, and behavior from outside influences, some taboos are additionally imposed, appropriate to the cultural context. Although their customary law is complex and open to multiple interpretations, there are ecological justifications behind those customs. All codes of conduct and related taboos which contribute to customary law have environmental implications and can mediate ecological strategies. To regulate their customs, the Baduy community has a unique traditional governance system which still functions strongly today. To enforce customary law and control violation of taboos, self-control mechanisms (sin), social control, and punishment are imposed [54]. The net result is that areas of natural forests are conserved within the Baduy landscape and as far as can be determined the natural biodiversity of these forests is protected.

"The *Kawalu* ritual performed by Baduy people is one of many mechanisms which cleanse the community and which punish people who violate taboos by imposing them to leave their community. In this way, the integrity of the Baduy community is maintained" [54]. Land is under communal control and held by the *Pu'un*, who is the supreme leader, but individual access to use, claim, or control certain land and natural resources is allowed to support livelihoods. There is evidence for the erosion of some traditions and practices by many Baduy people, and some have become "contaminated" by modern lifestyles. They then have to leave the Inner Baduy village and move to the Outer Baduy village as part of their punishment. The trend towards gradual erosion of customary law still continues in the Baduy community. Generally, both the Inner Baduy and the Outer Baduy people still believe and observe their *adat* and belief system (*Sunda Wiwitan*). The Inner Baduy hamlets have a structure consisting of *Pu'un*, *Girang Serat*, and *Baresan*, and they form the core of the traditional council of the Baduy community. As with many indigenous people, the Baduy face a dynamic and changing world and so they will certainly have to adapt to and accept environmental, social, economic, and political changes. The main question is how long the Baduy survive with their unique culture and how durable their *adat* institutions will be as external influences increase and when the pressure of globalization is even greater in the future.

The present behavior of the Baduy does ensure the maintenance of forest cover. They are effective in preventing outsiders from clearing or otherwise exploiting their forest. The forest habitat is therefore protected. Detailed biodiversity surveys have not been conducted in Baduy areas, so the extent to which the full range of biodiversity in the forests is protected-is not known.

6.2. The Iban of West Kalimantan

Indigenous people of Kalimantan were called "Dayak" (people from the interior) by the Dutch, but they use more specific terms to describe their ethnicity in their own languages. Many different Dayak groups exist and include the Iban, Kenyah, Kayan, Ngaju, Lundayeh, Merap, Embaloh, etc. Dayak communities in Kalimantan are known for their traditional belief systems, taboos, norms, and traditional knowledge of their environment and especially of medicinal plants [36,47]. The Iban do not harvest excessive quantities of natural products, and they practice strict resource management systems [55]. The sustainability of these Iban forests management practices is well documented in a study by Dennis et al. [56]

A study of the conservation of orang utan populations in West Kalimantan has shown that conservation should not focus exclusively on the single species, but rather on the need to maintain social and natural capital, cultural diversity, and ecological functions at various institutional levels and across geographical scales [57]. Some Dayak groups still practice taboos, and have restrictions on the hunting of orang utans. The Iban community believe that their ancestors were helped by the orang utan during a tribal war, so they cannot hunt them. Some younger Iban who have converted to Christianity do not retain the same values as their grandparents or parents. As informal institutions weaken, development becomes a threat to the community norms and practices.

Social movements are important to create transformative cross-scale communication that could recouple global, national, and local society [58]. Kalimantan is under pressure from development and its people are increasingly integrated into the cash economy [26,59]. As with other tropical forest areas, the people have to deal with the arrival of industrial plantations and mines. Some of these indigenous people struggle to adapt to new technologies and rapidly changing lifestyles. Resource extraction driven by international investors and national governments is transforming landscapes. Local administrations require resources for the growth of the economy and the situation is further complicated by the arrival of migrants attracted by opportunities of employment in agriculture and agro-industries. The changes in the lives and institutions of the Dayak communities are widely documented by Tsing [26].

Dayak sustainable resource management faces two problems: modernization, which has altered Dayak lifestyles over the past several decades, and the Indonesian central government's attempts

to control access to resources on Dayak lands [26,58]. I spent several months with the Iban in their longhouses in the Kapuas Hulu in 1997 and observed that many traditional practices were still maintained. On visits to the area between 2012 to 2015, I found that the Iban were still very interested in the idea of conservation of the forests around the Betung Kerihun National Park and the upper Kapuas areas, but pressure of development from migrants and estate crop industries in the region are increasing, and people fear that they will be marginalized if they do not integrate into these industries and become less dependent on the forests. The degree to which the Iban continue their traditional conservation practices is declining and this decline appears likely to accelerate in the future.

6.3. The Mentawai of the Siberut Island off West Sumatra

I spent several months living with the Mentawai in 1999 and 2000 and observed that they retained many of their traditional natural resource management practices. More recently, Quinten et al. [60] studied hunting of four endemic primates of Siberut Island by the Mentawai and examined the attitudes of indigenous inhabitants to resources utilization. Quinten et al. [60] assessed the scale and impact of hunting of primate populations to determine if hunting could be sustainable. They concluded that present levels of hunting could be sustainable, but that when hunting combines with other forms of disturbance such as logging and habitat loss the outcome is likely to be unsustainable [60]. Mentawai has one of the world's highest levels of primate endemism [61] and is a critically important area for global primate conservation. The main threats to primates are habitat loss, land use change, and hunting. Logging, land clearance, and agricultural expansion driven by immigrants from other parts of Indonesia are leading to significant loss of intact forests across the Mentawai islands [60,62]. When I lived with the Mentawai in the 1990s, primate hunting and the consumption of primate meat were important parts of rituals and ceremonies associated with the belief system of the Mentawai people.

The *Arat Sabulungan* (Mentawai traditional belief system) holds that every living thing and any moving object including waterfalls, rivers, and the wind together with stationary objects such as rocks and trees and natural phenomena such as rainbows, thunder, and lightning, that each of these things has a soul (*simagre*). Delfi [63] explained how the Mentawai believe that human interventions in nature and other objects have consequences which could lead to imbalance or disturbance. They believe that it is important to restore the balance through ceremonies which attempt to heal and recover what was lost. These traditional cultural practices were very much in evidence during my stays with the Mentawai in the 1990s. However, the distinctive way of life and elaborate religious ceremonies centered on the *umah*, ceremonial house, are under threat from the Indonesian government which wishes to 'civilize' the Sakuddei people [64,65].

Until recently, the traditional Mentawai faith of *Arat Sabulungan* was not recognized as a proper religion by the government of Indonesia. The Mentawai were encouraged to embrace other religions if they wanted to advance and become "modern". Threats and harsh treatment by the Indonesian military were used to discourage people who were practicing *Arat Sabulungan* [65]. The Mentawai still practice their traditional beliefs even though they have officially adopted Christianity or Islam [66]. The *kerei* (medicine man or shamans) still lead ceremonies and heal the sick.

The Indonesian government has consistently tried to develop remote areas of Indonesia by launching "modernization programs" for *masyarakat terasing*. This term *masyarakat terasing* translates as "isolated communities" and is used pejoratively on the assumption that these groups are isolated from 'modern Indonesian culture' and do not contribute to the unity of the nation [25,67]. After independence, Indonesia's main goals were national unity and cultural adaptation. Isolated communities had to adapt their agriculture, religion, and education [66]. On Siberut Island, as with many other islands, these government actions had strong impacts on the people, especially the younger generations. Traditional Mentawaian religion was forbidden, and *kerei* were told to abandon their ceremonial objects and withhold from further practice. Everyone had to convert to a monotheistic religion (one of the five religions that were allowed by the government: Islam, Catholicism, Protestantism, Hinduism, and Buddhism); tattoos and loin cloths were forbidden as they

were considered "primitive". Since the fall of the Soeharto regime there has been a welcome change in government policies towards traditional religions and practices. Identity cards previously only allowed for recognition of one of five monotheistic religions, however, since 2016 people have been allowed to record their local religion/belief system on their identity cards. Laws allowing community management of forests also reflect this liberalization of attitudes towards ethnic minorities. This new acceptance of diverse local religions may provide conservation benefits if it allows traditional conservation practices to achieve legitimacy.

6.4. The Kajang of South Sulawesi

Between 1994 to the late 1990s I visited the Konjo speaking Kajang communities who live in Bulu Kumba district in South Sulawesi on several occasions. The *Ammatoa* customary community or *Kajang* (*Kajang Dalam* or "inner circle") communities with their traditional belief in *Patuntung* have a tradition of leading a simple and humble life. *Adat* institutions in Kajang territory are aligned with the mystical belief system of the spirit cult of the *Ammatoa* [68]. The *Ammatoa* (the *adat* leader) exercises supreme control over spiritual and moral affairs as he is the supreme leader in affairs relating to *adat* rules defining socio-religious norms and morality. He is the protector and controller of the community with respect to moral and spiritual aspects of social life [69]. The *Ammatoa* is considered to have supernatural power and people around Bulu Kumba believe that the Kajang practice mysticism. Outsiders fear the Kajang, and this is probably why forests are still intact in the area.

Whilst staying with the Kajang I observed that strict regulations applied to many aspects of Kajang behavior and that severe punishments were applied to people who transgressed these rules. For example, when a person wanted to cut a tree, he was required to plant two similar trees. Harvesting honey from the forest was only allowed for feasts and ceremonies. Taking medicine from the forest was only allowed in case of genuine illness and not for sale. The *Pasang* was the point of reference for the people and the source of religious values [69]. The people believed that the *Pasang* communicated messages from ancestors. *Pakpasang* messages from God described the relationship between the Creator and human beings. Forests are sacred places. Kajang are not allowed to change any land or the soil surface. They are required to build their houses using unprepared logs rather than sawn timber or other modern materials. Areas of natural forest were retained in the Kajang landscape.

The Kajang are one of the groups to whom communal forest rights have now been granted. The Kajang forests are home to a number of rare and endangered animals and plants endemic to Sulawesi. The award of forest rights to the Kajang should contribute to the conservation of the forests and their endemic species, but, as elsewhere, there is little empirical evidence to allow us to judge just how safe this biodiversity will be. At this stage a thorough study of the biodiversity in the area is needed to monitor biodiversity richness and landscape changes.

6.5. The Punan Tubu of East Kalimantan

Conservation of forests and biodiversity has different meanings and values for the Punan. The Punan in Malinau and the Tubu catchments are hunter-gatherers. They now face development pressures and roads are opening up to the interior of the Tubu highlands. Punan communities are no longer nomads, but mobility is still high [37]. Some Punan Tubu communities live in the nearby town of Malinau (in *Respen* Sembuak, a resettlement village that has existed since the 1970s) and other members live in remote highlands areas about a four-day trip by motor canoe from Malinau. Only recently, a road has been opened to the Tubu area which will make the pressure even greater on the natural forests in the region.

Remote Punan communities are very dependent on trade, their main income comes from the forests. Sellato [70] and Cunliffe [71] explained the importance of trade in the life of the Punan where they live in symbiosis with other Dayak groups, and they rely on *gaharu* and other Non-Timber Forest Products (NTFP) to barter for their basic needs. They provide *gaharu* (*Aquilaria* sp.), hornbill ivory, bird nests, camphor, bees wax, rhinoceros horns, resins and gums, rattan, bezoar stones, tusks and furs of

wild pigs, leopards, and bears, antlers of deer, etc. in exchange for salt, tobacco, iron products, and cotton textiles that the other Dayak groups can provide. Nowadays the Punan are still dependent on *gaharu* and bird nests, but these products are harder to obtain.

Studies of the value of forests and their importance to the local communities in the Malinau landscape [72,73] provide local perspectives on the importance of biological diversity using the methods of multidisciplinary landscape assessment. The myth that Punan leave their dead family members in the forests in large ceramic jars persist. The Punan prefer not to have outsiders going into their territory. People therefore would not dare disturb sacred forest areas. Gravesites are very important locations in the forests with rich biodiversity conservation values, as these sites are usually protected and free of Non-Timber Forest Product collection. No one is allowed to go into sacred forests and therefore these are potentially valuable biodiversity conservation areas. However, the large ceramic jars which are very valuable are now often stolen. The destruction of gravesites has become a concern when concession companies open up these areas. Concession companies do not understand nor value the importance of sacred forests for the Punan [73].

Punan Tubu still consider forests as their main livelihood resources; some claim that it is their safety net. Hunter-gatherers who become sedentary tend to lose the diversity of food resources that are rich in protein and fiber [74]. Punan closer to urban areas are in better health as they are closer to health care and markets. However, some Punan from *Respen* still wander seasonally into the forest in search of forest resources which enrich their diets and provide extra income.

Forest biodiversity is important to the Punan because of their dependence on livelihood activities which include harvesting food and crop resources, and the collection of Non-Timber Forest Products. [71]. The Punan also want to integrate with the cash economy and value the advantages that development brings to their daily lives. The Punan appreciate better livelihoods and they certainly like to catch up with their Dayak neighbors who have good jobs and better agriculture systems [38]. Attempts to engage the Punan in conventional agriculture system have often failed and they may need to find systems that are more suited to their local context. The Punan will need to adapt to new conditions and integrate themselves into the cash economy to survive in a changing world. The ability of the Punan to actively conserve their biodiversity may be declining.

7. Conclusions

I have restricted my review to a small number of communities with whom I have had personal experience. They are just a few of the hundreds of communities that I might have chosen. They illustrate the fact that the elements needed for successful community management still exist in many locations, but that even in these remote areas they are rapidly being eroded by the forces of modernity. The extent to which these traditional practices can contribute to biodiversity conservation will depend upon the persistence of local management systems and the regulatory conditions that support them.

Conservation is not a uniformly understandable concept. Conservation has multiple interpretations. Biodiversity can relate to plants, wildlife, knowledge, culture, etc. With the changing world and increasing pressures of development there are inequitable distributions of rights and responsibilities for natural resources [21]. Kumar has noted that community-based conservation is here to stay. The question is how community involvement can be made effective. Conservation can work if it is undertaken by recognizing and building on what local people find important and on what matters for their livelihoods [73]. Protection of biodiversity must be based on a wide range of approaches to develop a shared understanding of compatible conservation and development goals at various scales. I emphasis the principle that conservation has different meanings and objectives for the communities who manage forests from those of international environmental negotiators. Management of forests for local communities is not necessarily going to conserve biodiversity.

Masyarakat terasing (isolated communities) in Indonesia such as Baduy, Kajang, Mentawai, some Dayak groups, Bajau, and others who live in remote parts of the archipelago are all seeking

improvements in their material well-being. Many communities still have strong informal institutions, and still practice traditional belief systems. Most of these peoples would prefer that their forests should still be in good condition, but development provides many of the improvements in their lives that they seek [36]. How long will they be able to survive in a changing world given the influence of the cash economy that dominates modern societies? How can these people adapt their way of life to this pressure of development, and will they still find it worthwhile to conserve biodiversity?

In Bali, people are strongly connected to the modern economy and are experiencing growing economic development, but their traditional belief systems are still maintained. Some forested landscapes are still intact even in accessible areas such as around the Batu Karu temples just 40 km from the tourist areas of Kuta and Seminyak. People in these *Bali Aga* communities still have deep respect for their Gods, Goddesses, and Spirits. Their life is still linked to their environment in the same way as the Baduy, the Kajang, the Mentawai, and other ethnic groups. The rural Balinese still believe that misfortune will occur if they harm the environment, their forests, their water and trees. However, in these communities an increasing proportion of the people are moving out to live, work, and study elsewhere, and these people tend to be less respectful of traditional values. Even if a major part of the population of a village respects traditional conservation measures it is possible for a small minority who do not respect these values to do great harm to the environment.

Conservation of biodiversity values in locally managed forests in Indonesia will only occur if certain preconditions are met. It is unrealistic to assume that *adat* rules will be adequate to ensure conservation. *Adat* rules relate to features of the landscape that have instrumental or cultural values and much biodiversity might not have such local values. Even *adat* rules that might have protected areas of sacred forest against any form of disturbance have been weakened by over a hundred years of deliberate attempts to impose uniform cultural and social values upon the Indonesian people [25]. The communities whose traditional behavior is described in this paper are exceptions to the general rule—they are communities that have sought to distance themselves from modernity and have retained a higher dependence on *adat* rules than most other communities. The erosion of *adat* rules does not mean that other communities will not protect biodiversity. There are many situations where biodiversity does provide instrumental value to communities. The people around the Tangkoko reserve in North Sulawesi protect birds, the Spectral Tarsier and the Black Macaque, because they make money from visiting eco-tourists. Local people protect the display sites of birds of paradise in the Arfak Mountains in West Papua and on the island of Halmahera because visiting bird watchers contribute to the local economy. Beautiful seascapes in several Eastern Indonesian islands are starting to yield income for local people as scuba divers come to see the richness of coral reefs and marine biota that are globally rare. Many other similar examples exist throughout the archipelago.

However, many biodiversity values are not apparent to local communities. The high value attached to obscure species by international conservation interests is difficult to understand for rural people. In many cases protecting these "global public goods" values of biodiversity would only make sense to local people if they received some benefit from doing so. Payments for environmental services might encourage people to protect such species and their habitats, but up until the present such payments have been promised but have rarely materialized [75]. Understanding that incentives are multidimensional and that equity and empowerment sometimes are more important than monetary incentives are essential to make things work [20].

Decentralizing forest management to communities is desirable and communities must surely be better stewards of forest values than the government agencies that have failed so miserably to do this in recent decades. However, simply handing over control is not enough. The nature of local control, the rules under which it operates, and the institutions needed to ensure equity and justice in exercising local rights will be different in different locations. There is no "silver bullet" to ensure the success of local management. Arrangements will have to be tailored to local conditions. Biodiversity values differ in their susceptibility to change and local capacities are variable. Optimal conservation strategies may differ radically depending on the objective and the location. Good governance and

strong government institutions are vital, but Indonesia has struggled to make its forest institutions work effectively. Greater recognition of *adat* institutions and traditional belief systems are needed, and decentralization should strengthen, not weaken these traditional systems. Legal and regulatory systems must be strengthened. Strong community leaders will be needed. Indonesia has the world's highest levels of biodiversity and the conservation of this unique resource will depend upon the transition to decentralized management being conducted thoughtfully and carefully and with full recognition of the potential for failure if the right match between modern and traditional cultures and practices is not achieved.

One vital step in using the decentralizing process to achieve conservation outcomes is the accumulation of evidence. More research is needed to improve our understanding of the maintenance of biodiversity in all forests areas. At present, biodiversity is being lost in forests managed by government and by communities. There is an urgent need to produce evidence on biodiversity outcomes in locally managed forests. If biodiversity is to be conserved, mechanisms must be put in place to assess biodiversity outcomes in all government, corporate, and community managed forests. We have argued elsewhere for more effective ways of measuring the performance of complex forest landscapes [76]. The extent of natural forest cover, the protection of key species, and the ability of communities to protect their forests against outsiders must all be subject to measurement. Only by doing this will we have the empirical knowledge needed to justify expansion of the role of communities in biodiversity conservation.

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