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The policy terrain in protected area landscapes: challenges for agroforestry in integrated landscape conservation

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Abstract. Integrated ecosystem and landscape approaches to conservation are moving from concept to practice in many parts of the developing world. Agroforestry – the deliberate management of trees on farms and in agricultural landscapes – is emerging as one of the most promising approaches to enhance and stabilize rural livelihoods, while reducing pressure on protected areas, enhancing habitat for some wild species, and increasing connectivity of landscape components. For the potential of agroforestry to be effectively harnessed, however, the policy and institutional environment needs to provide farmers with clear incentives to plant and protect trees that contribute to both ecosystem function and rural livelihoods. This paper analyzes the policy terrain affecting agroforestry around protected areas in five very different contexts across Sub-Saharan Africa, finding both expected and unexpected similarities. Across the sites in Uganda, Cameroon and Mali, the study revealed a rough policy terrain for agroforestry – systemic market constraints, contradictions between development approaches and conservation objectives, and inconsistencies in institutional and regulatory frameworks. Making the conservation landscape approach more effective will require that both agriculturalists and conservation planners have much greater appreciation for the conservation and livelihood potential of agroforestry.

Introduction

Conservation strategies are rapidly shifting to a regional or landscape-scale approach (Franklin 1993; Hobbs et al. 1993; McNeely 1994; Haig et al. 1998; CABS 2000; Poiani and Richter 2000; Sanderson et al. 2002; Angelstam et al. 2003), replacing the previous model of segregated landscapes – protected areas under strict surveillance surrounded by a buffer zone (Terborgh 1999). The 1992 UN Convention on Biological Diversity mandates an ecosystem approach to conservation, and many proponents argue that a landscape-scale or ecosystem management approach is the most effective way to sustainably reduce threats and conserve species, communities and habitats in landscape mosaics that may include protected areas. The landscape approach is purported to create connectivity and lateral flows between landscape units (van Noordwijk et al. 2001a), support key ecosystem processes (Simberloff 1998), reduce the

fragmentation and isolation of forests (CABS 2000), and maintain the long-term survival of known and unknown species and communities (Benitez 2003).

Dialogue surrounding landscape conservation has so far focused on biodiversity and related anthropogenic threats or degradation, often concentrating on creating an appropriate balance between segregation and integration of landscape units (van Noordwijk et al. 2001a), but generally failing to conceptualize people and institutions as core components of ecosystems and landscapes (Machlis and Force 1997). Moving beyond protected area boundaries to integrate conservation into a matrix of multiple land-use systems necessarily brings conservationists into a complex environmental and institutional realm where ecosystems provide critical goods and services to a variety of actors engaged in subsistence and commercial activities (Simberloff 1998; Poiani and Richter 2000). Landscape-level conservation planning, including the creation of vegetation-rich corridors connecting protected areas, intends to cover wide swathes of terrain (CABS 2000). Yet the study of large-scale projects reveals that the inability to understand adaptive human systems often results in failure, sometimes catastrophic, of these projects (Scott 1998). The real challenge to a landscape approach is thus institutional: how to harmonize institutional mandates and needs of the wide range of inhabitants, users, owners and administrators to foster conservation.

According to environmentalists and agroforesters alike, agroforestry has the potential to help integrate protected areas with their surrounding landscapes, and mediate the livelihood demands of communities with the conservation goals of protected areas. Leakey (1997) describes agroforestry as, 'a dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels'. From this standpoint, the term agroforestry applies to both indigenous systems for using and managing trees and agroforests, as well as external interventions that expose farmers to new tree-based systems, new approaches to managing existing systems, or new market opportunities for tree products. Within the context of this study, agroforestry primarily refers to the latter.

According to Schroth et al. (2004), agroforestry has much to contribute to tropical biodiversity conservation through reducing pressure on natural forests, creating or conserving habitat for wild biodiversity, or as a land use that enhances landscape connectivity. However, they go on to argue that the effective integration of agroforestry 'is a major policy and institutional challenge' (2004: 499). Furthermore, Swallow et al. (in press) review the contribution of agroforestry to biodiversity conservation, finding both positive (e.g., more species, alleviation of stress on protected areas) and negative (e.g., invasive species, incursion into protected areas) effects. They also highlight that agroforestry systems change, often rapidly, in relation to markets, extension messages, and institutional shifts. In the Middle Hills of Nepal, for example, increasing market access prompted a rapid increase in tree planting and

chemical fertilization (Gilmour 1995). In Ghana's Central Region, farmer' decisions to retain or eliminate forest trees from their perennial tree-crop systems depend on variables that include: financial constraints to hiring a chainsaw team to fell trees, local bylaws placing a ban on chainsaw operation, or a species change from shade tolerant cocoa to shade intolerant oil palm (Amanor 1996).

Land and resource tenure systems also affect natural resource management and agroforestry systems. Property rights systems respond to internal pressures, such as population density and climatic fluctuation, and external pressures, such as migration and changes in political governance. According to Wiebe and Meinzen-Dick (1998), land tenure systems in many developing countries are changing from customary systems that accommodate multiple parties, to systems of single or individual ownership. They argue that,

> In practice, in the process of formalizing tenure arrangements, the bundle of rights that constitute land ownership are often consolidated – whether deliberately or unintentionally – in the hands of a single 'owner', and many of the subtleties which historically allowed other right-holders to access, use or influence the disposition of land are lost. The problem with simple (or simplistic) concepts of land 'ownership' is that the nominal landowner is not generally the only person affecting or affected by the use of the land (1998: 2).

The effects of property rights and property rights change on agroforestry are thus uncertain. Many indigenous systems provide for enhanced tenure security in response to investments in the land – common indicators of investment are clearing of indigenous vegetation and planting of exotic trees, especially along plot and farm boundaries (Place and Swallow 2000; Unruh 2002). Individualization of tenure may reduce access to trees on former common land, while potentially enhancing incentives to invest in the land.

A landscape conservation approach to agroforestry therefore needs to recognize and work with a diverse array of natural, social and political systems, particularly regarding people's use and management of trees, as integration will take place within human inhabited landscape mosaics and agroecosystems (McNeely and Scherr 2001). As economies, markets, tenure systems, and laws change, so too do the critical human-tree interactions that lie at the core of any agroforestry intervention or use system. This paper seeks to fill a gap in the literature relating to agroforestry and protected areas and landscape-scale conservation by suggesting that the 'policy terrain' of conservation landscapes has major effects on the potential of agroforestry to contribute to conservation through the various pathways discussed above. Policy terrain assessments conducted in three African countries suggest a number of common policy challenges both for agroforestry and the overall landscape approach to conservation.

Framing studies of policy terrain in conservation landscapes

While the ecosystem or landscape approach has been discussed by conservationists for several years, there still is a strong tendency for conservationists to examine the landscapes through the lens of protected area management, neglecting the many other policies, processes and programmes that shape the use and extraction of resources in the landscape. The policy terrain affecting tree management and tree planting, for example, depends upon the policies and institutions affecting forestry, public works, property rights, markets, environment, wildlife and food security. Policies adopted at a national level often end up having contradictory effects within conservation landscapes. The policy terrain is shaped by much more than national policies, however. A farmer choosing whether to clear native vegetation, or plant new trees, will also respond to specific local-level phenomena, including markets, roads, extension and the legitimacy and power of the social or legal authorities that enforce rules on resource use. We draw upon two areas of literature to frame our policy terrain studies: legal pluralism and political economy.

The theory of legal pluralism emanates from the scholarship of legal anthropology. It has been used both as a normative framework and a positive prescription. The normative approach recognizes that individuals' resource use patterns are affected by multiple systems of law that are underpinned by multiple sources of social or legal authority, ranging from national governments, to customary authorities, to local groups, to projects or programmes. The normative approach makes sense of the fact that a particular legal or regulatory framework will manifest itself in very different outcomes in local contexts shaped by different arrays of countervailing or complementary local authorities. Kamara et al. (2004) for example, studied the different local consequences of Ethiopia's national Kabele system of local governance and land tenure. The normative approach also makes sense of projects or programmes that generate local 'success stories' that fail when 'scaled up' to the national level. The prescriptive approach to legal pluralism argues that multiple, flexible, and dynamic legal orders, which support multiple access regimes, are 'more responsive to these uncertainties and changes than a single, fixed legal system with a static property regime' (Meinzen-Dick and Pradhan 2001:10). Our studies do not support this sanguine view of the multiple and over-lapping authorities and laws that affect agroforestry and resource management in conservation landscapes. On the contrary, our studies of protected area policy terrains suggest that a pluralism of policies creates multiple restrictions and conflicting objectives that weaken the resilience, stewardship and management of natural resources.

The second area of literature that we draw upon is the political economy approach. Weaver (1996) applied such an approach in his examination of the policy terrain affecting forestry production in northern Mexico. Weaver concludes that large international political and market processes (the North American Free Trade Agreement), and centre/periphery patterns of power and

resource extraction, are as important as forestry policies per se in shaping the forestry policy terrain in northern Mexico. This paper takes a similarly broad approach to the policy terrain affecting agroforestry in conservation landscapes, including decentralization of governance, forestry, agriculture, rural development, and environment. We focus the analysis on four aspects of landscape management: (1) policy support for integration or segregation – does the policy environment promote integrated patterns of land use and resource use, such as multi-strata agroforestry and community forestry, or does it promote clear segregation of land uses and management in which people are excluded from biodiversity benefits? (2) consistency of development and conservation approaches – do development and conservation agencies work together toward unified goals or are their goals contradictory? (3) markets for forestry and agroforestry products – do markets provide incentives for farmers to engage in enterprises consistent with sustainable resource extraction and investment in agroforestry? (4) legal consistency – do the multiple laws and sources of power provide an overall context that promotes sustainable land management?

Description of study sites

A study of the policy terrain in conservation landscapes was conducted around five protected areas in three African countries: Uganda's Bwindi Impenetrable National Park (BINP); Cameroon's Campo-Ma'an National Park (CMNP) and The Dja Biosphere Reserve (The Dja); and Mali's Classified Forests of Faira and Dioforongo. These study sites in the Sahel, the humid forests of Central Africa, and East/Central Africa were chosen to represent some of the wide contrasts in environmental conditions and legal histories that prevail across Africa. The BINP site in Uganda contains lowland and highland forests of the Afromontane forest belt in central/east Africa. It inherited a legal tradition from the British colonial past. The Mali sites are representative of the semi-arid West Africa Sahel that stretches from Senegal in the west to Chad in the east. It is a former colony of France. The Cameroon sites are in the humid forest zone, in a part of the country formerly colonized by France. Study sites in all three countries were chosen for their high importance to national conservation objectives and for the presence of various actors engaged in conservation, development and decentralized governance. The three countries have relatively stable political systems and are among the most progressive countries in Africa in implementing new approaches to decentralized governance and conservation management. The World Agroforestry Centre has active research programmes and works with partners in all three countries, and is expanding its work in conservation landscapes.

BINP is located in southwest Uganda's Kigezi Highlands. It is thought to harbor one of the most diverse forests in East Africa, including 26% of Uganda's woody species, and the highest biodiversity in East Africa for birds,

butterflies, plants and primates (Cunningham 1996). Ranging in altitude from 1190 to 2607 m, this suspected Pleistocene refuge encompasses 321 km^2 of lowland forest belonging to the Guineo-Congolian phytochorion and highland evergreen forest (Cunningham 1996). BINP receives an average annual rainfall of 1000–1500 mm, typically between March to June and October to December. BINP is a World Heritage Site and home to half of the world's remaining population of mountain gorillas (*Gorilla gorilla beringei*), making it a popular destination for tourists and researchers. BINP is almost entirely surrounded by an agricultural landscape, making it a critical watershed for the surrounding agricultural highlands (UNEP 2004), and the source of rivers that flow into Lake Edward and Lake Mutanda (Cunningham 1996). Research around BINP took place in Kabale District, within the Ikumba and Muko sub-counties. Kabale has two main ethnic groups. The majority population of Kabale are Bakiga, Bantu agriculturists, while the minority Batwa now struggle to make a living in Bakiga towns and farms, but used to reside in Bwindi Forest as nomadic hunters and gatherers. One of three districts that border the park, Kabale is an intensely cultivated landscape of patchwork plots scattered across steep mountain slopes, moderately steep hillsides and valley bottoms. Kabale District has one of the highest population densities in Africa, estimated at 370 persons per square kilometer (Africare 2002). Squeezed onto fragmented farms, residents grow an assortment of Irish potatoes, maize, sorghum, wheat, bananas, beans, peas, sweet potatoes and a variety of other crops. On average 34% of households own less than 0.21 ha of land (Africare 2002), and due to intense cultivation and steep slopes, soil erosion and soil fertility loss are major problems that contribute to poor or reduced harvests. There is a high demand for fuelwood and farmers tend to grow small woodlots of Eucalyptus (*Eucalyptus* spp.) and the invasive Black Wattle (*Acacia mearnsii*). Some farming households also grow home gardens, plant hedgerows, border plantings and intercrop trees. The farming landscape has low native species richness and density (Kindt 2002).

In June 2002, CARE's Development through Conservation (DTC) Project ended after a decade of integrated conservation and development activities. This project incorporated agroforestry technologies to meet firewood and pit sawing demands. It also negotiated multiple use zones for a limited number of basket weavers, beekeepers and medicinal specialists within the park. The World Agroforestry Centre and Africare continue to operate in this region, promoting agroforestry research and development.

The tropical humid forest covers over 60% of the national territory of Cameroon (MINEF 1998). It is divided into a vast patchwork of national parks and reserves, logging concessions, agro-industrial plantations, community forests and village habitation areas. CMNP is one of Cameroon's youngest national parks, though it does have a longer history as partial faunal and production reserves (WWF 2005). It was created in late 2000 as compensation for environmental damage resulting from Exxon-Mobil's 1000 km Chad-Cameroon pipeline (D. Tounouksala, personal communication). CMNP

encompasses over 2640 square kilometers[1]of Atlantic coast forest and dense humid tropical forest ecosystems in the lower altitude zones, as well as Guineo-Congolian forests. The park has a high diversity of flora and fauna, including 1500 plant species, 29 of which are endemic to the park, 80 mammal species, 122 reptiles and 249 fish species (WWF 2005).

Located in Cameroon's Southern Province on the border with Equatorial Guinea and the Atlantic Ocean, the park's surrounding landscape consists of logging concessions with 30 year leases, an agro-industrial oil palm plantation (Socopalm), a rubber plantation (Hevecam) and agricultural and forest dwelling communities.

Research took place in proximity to the towns of Campo and Ma'an. A consortium of actors that include the World Wide Fund for Nature (WWF), an international logging corporation, and park officials from the Ministry of Environment and Forests (MINEF) have united as part of a technical operational unit to create an integrated landscape management plan.

The CMNP landscape has a very low population density of 7.3 people per square kilometer (WWF 2005). The dominant ethnic groups (Bulu, Mvae, and Ntumu) are of Bantu origin, and are primarily agriculturists. Swidden agriculture is the dominant land-use practice in which primary or secondary forests are cut and burned to plant maize, groundnuts, cassava, coco-yam, plantain, banana, and 'ngon' (*Cucumeropsis edulis*). Typically, after the harvest, fields are left to regenerate for many years. There are two planting seasons per year, which fall just before the biannual rains in November/December and April. Cocoa fields are common. Families rely strongly upon non-timber forest products for food, materials, medicine, and income (van de Berg and Biesdbrock 2000; Dkamela 2001).

CMNP has a minority population of Bagyeli or Bakola people. Commonly referred to as pygmies, these forest dwelling, semi-nomadic communities rely upon the forest for their livelihood. Their camps are often allied with Bantu communities for administrative purposes or through intermarriage or exchange of labor, bush meat, non-timber forest products, crops, clothing or money. Typically, Bagyeli and Bakoala families cultivate only one small field per year, and rely primarily on hunting and collection of non-timber forest products from the primary forest (van de Berg and Biesdbrock 2000; Dkamela 2001).

The Dja is a United Nations World Heritage Site and Biosphere Reserve. It is the largest, and one of the oldest reserves in Cameroon, covering an area of 5000 km^2 of Atlantic, semi-deciduous, and evergreen dense humid forests, and houses a rich diversity of fauna including 109 mammal species, 360 bird species and 62 fish species (Williamson and Usongo 1995). Presently, a number of national and international organizations are working to establish corridors to link The Dja with Odzala National Park in the Democratic Republic of Congo and Minkebe National Park in Gabon in a transboundary biodiversity conservation initiative.

[1]Including the buffer zone, CMNP encompasses 7000 km^2.

The Dja landscape population density is under five people per square kilometer (Dkamela 2001). As with CMNP, Bantu agriculturists are the dominant ethnic groups. The Dja also has a minority pygmy population, including the Baka and Kaka. Research around The Dja focused on the area of Lomié in the Eastern Province. In addition to swidden agriculture, hunting and sale of non-timber forest products, community forestry is a common venture in the area, and Lomié has over eight local and national non-governmental organizations working on community forestry, environmental or development issues. Commercial logging is also a dominant economic activity in the landscape surrounding The Dja. Maintaining forest biodiversity outside of both protected areas is crucial to reducing threats to biodiversity within the parks, and to protecting parks from illegal logging or becoming islands within a sea of logging concessions and monoculture agro-industrial zones (Curran et al. 2004).

In Segou, Mali, the Classified Forests of Faira and Dioforongo come under constant pressure from border and urban populations. This human exploitation, coupled with climate change, has caused significant degradation of the forests. Both forests fall within Mali's semi-arid lowlands, encompassing wooded and woodland savanna and light forest. Within this belt, the dry season persists over nine months of the year, producing very high temperatures and frequent periods of drought (Republique du Mali 1998). From 1994 to 1998 the mean annual rainfall from July through September was 586.2 mm (Levasseur et al. 2004).

The Classified Forest of Faira was gazetted in 1944 (MDRE 1992b). It is located fifteen kilometers from the city of Segou and covers 3200 ha of highly degraded woodland. Few large trees remain within the forest, with the exception of a few baobab (*Adansonia digitata*), karité (*Vitellaria paradoxa*), and remnant stumps. *Acacia seyal*, *Khaya senegalensis*, and thickets of *Combretum micranthum* are present, as is the native invasive shrub, *Guiera senegalensis*, which indicates poor soils. The terrain is flat and there are no streams or permanent water sources (Ashley 2004).

The Classified Forest of Dioforongo (MRDE 1992a) was gazetted in 1948 and encompasses 10,000 ha of light forest. An informal transect walk showed the dominant species to include *Combretum micranthum*, *Guiera senegalensis*, *Anogeissus leiocarpus*, *Sclerocarya birrea*, *Ximenia americana*, *Cordyla pinnata*, *Acacia seyal*, *Gardenia erubescens*, *Pterocarpus lucens*, *P. erinaceus*, *Bombax costatum* and *Acacia macrostachya*. While Dioforongo's forest is more intact than Faira, human exploitation is taking a toll, evidenced by a lack of *Vitellaria paradoxa* and selective logging of *Bombax costatum*.

Today, both of the Mali forests are surrounded by extensive 'parkland systems' in which evenly aged mature trees (of value to the household economy) are spread across cropped fields, and recent fallows (Boffa 1999). Villages also have sylvi-pastoral zones where grazing and firewood collection occur. Farmers cultivate millet, sorghum and other cereals, along with peanuts, beans, fonio (*Digitaria exilis*), and corn. They rely on non-timber forest products from trees on farm and in the classified forest for a variety of products for the home

and market, including firewood, oil, soap, condiments, fruits, medicine and dyes. As part of its Sahel programme, the ICRAF-IDRC biodiversity project is developing a landscape conservation strategy for agroforestry parklands in Mali and Burkina Faso, which will work with farmers to ensure sustainable management and enrichment planting for biodiversity conservation (A. Kalinganire, personal communication).

Methods

A standard set of methods were employed in all sites to gather data on the overlapping policies, laws, bylaws, customary arrangements, actors, and interests; retaining considerable flexibility to accommodate the different social, political, and natural environments. At each site, semi-structured interviews were conducted with local and national government representatives who carried administrative or enforcement responsibilities within the greater protected area landscapes. These positions typically included mayors, regional government administrators, forest officers, environment officers, and park officials. Semi-structured interviews were also conducted with institutions outside of the government sector. These included local, national, and international non-governmental organizations working on environment or development issues within the area, as well as one logging company. Finally, semi-structured interviews were conducted with groups of villagers adjacent to the protected areas. As each site presented unique situations and constraints Table 1 outlines how the various villages were selected from the overall population residing within a defined region of the protected area landscape, and the composition of the various focus groups. For each group interview session we requested 10 participants who represented different family groups, however out of respect for the local authorities we left the actual selection process up to the village leaders. Participation ranged from approximately 8–30 people per meeting.

Results and discussion

The study describes key international, national, and local policies, laws, mandates and practices that influence farmers' choices and evolving decisions about trees, forests, forest products, land-use, and protected areas. Despite the fact that Uganda, Cameroon and Mali have all moved to adopt progressive forest and environment policies that facilitate decentralization, prioritize participatory management and poverty alleviation, and promote tree planting and on-farm conservation (MINEF 1996; The Uganda Forestry Policy 2001; Projet RESIDD no date), we find that the protected area policy terrain presents clear challenges to employing agroforestry as an integrated conservation landscape strategy. Delineation of hard boundaries, policy contradictions, rough market transactions, and legal ambiguity contribute to a political environment in

Table 1. Focus group composition and village selection methods.

Country	Protected area	Specific site location	No. of villages	No. of focus groups	Village selection method
Uganda	Bwindi Impenetrable National Park	Ikumba and Muko Sub-counties, Kabale District	7 villages	6 male groups 6 female groups	Random selection
				1 mixed minority group (Batwa)	Intentional selected
Cameroon	The Dja Biosphere Reserve	Lomié, Sub-Prefecture, Eastern Province	7 villages	4 mixed groups	Random selection, stratified according to ethnic group
	Campo-Ma'an National Park	Campo and Ma'an, Southern Province		3 mixed groups	Random selection, stratified according to ethnic group
Mali	Classified Forest of Faira	Segou	8 villages	4 male groups 4 female groups	Intentional selection based on village size and ethnic make-up
	Classified Forest of Dioforongo	Segou		4 male groups 4 female groups	Intentional selection based on village size, location relative to forest, and ethnic make-up

which conservation is still founded upon segregation and boundary creation, and national environmental policies and laws do not necessarily reflect or influence what occurs on the ground (Weaver 1996; Ribot 1999; McDermott 2000).

Drawing hard boundaries

Many policies of protected areas are designed to restrict access to and use of the protected natural resources, thus creating the image of a vigilant gatekeeper guarding the right of entry. Establishing distinct and/or hard boundaries to keep people out (and large mammals or forest vegetation in) may not seem unreasonable, however prohibiting resource flows (natural or anthropogenic) can serve to isolate patches within an intensified agricultural landscape, or even backfire to degrade the area under protection. For example, in Uganda's BINP, conservation laws permit a small number of user groups to collect medicine, basket material and honey within multiple use zones. But the laws completely prohibit extraction of wood products from the park. While this may be good for conservation, these laws push demands for wood onto the surrounding farmland, an area that is already under pressure from one of the highest population densities in Africa (Wild and Mutebi 1996). If tree properties were generic it would not matter that on-farm species richness is low, with farmland dominated by exotic Eucalypts and Black Wattle, and that native species densities are also low (Kindt 2002). But this is not the case. Farmers use on-farm trees for at least 16 different functions that demand different wood and non-wood properties. For example firewood, charcoal, building materials, mortars, beer boats, stools and other household items require different wood properties, many of which are only found among native species (Ashley 2005; Cunningham 1996). CARE's *Development through Conservation Project* (DTC) attempted to use agroforestry to remedy this problem, but their native species technologies were not widely adopted across the landscape, a common problem in the transfer of technologies (Rogers 2003). As a result, BINP's strict boundary clearly segregates the local population from forest wood products, thereby transferring the demand onto those forest species that remain on farms, further segregating the forest from an intensely cultivated landscape dominated by exotic trees. The hard boundary approach may indeed be suitable for conservation of this small patch with very high conservation value, but should be augmented by policies promoting a wider range of agroforestry approaches in the landscape matrix outside of the protected area.

Hard protected area boundaries only work if there are enough gatekeepers to protect them. Legally, rural Cameroonians living on the borders of CMNP and The Dja have no access to the protected forest resources, including wood products, non-timber forest products, and bushmeat. However, park officials, local leaders, and villagers agree that the conservation boundaries are not respected. Ironically, this establishes an 'illegally' integrated landscape,

10–20 km into the reserve that supports illegal resource flows. Mali's Classified Forests of Faira and Dioforongo present a similar scenario to that of CMNP and The Dja. In delineating distinct boundaries to protect the forest, the government effectively nullified customary jurisdiction and user rights, and enabled illegal exploitation. The current reality is that the forests are extractive vacuums rather than protected areas. Pressure on Mali's forests is high – the country obtains over 90% of its energy requirements from fuelwood (Word Resources Institute 2004). Villagers attest that foresters have a personal stake in and benefit from degradation. A high level forest officer in Segou claims that their department lacks the financial resources and manpower to implement and update management plans and to ensure protection. During the course of the study it became clear that the foresters stationed at each classified forest post were unfamiliar with classified forest laws and user-rights, and therefore lacked the knowledge to ensure protection. Coupled with the fact that the forests are politically disassociated from local populations and customs, the two classified forests become easy targets for unsustainble extraction of wood resources.

Drawing hard boundaries around non-protected portions of the landscape through the simplification and semi-privatization of property rights is another mechanism that promotes segregation and degradation. Cameroon's humid forest belongs to the state as part of the Permanent Forest Estate or the Non-Permanent Forest Estate. The government does not recognize traditional tenure and property arrangements, but does recognize private property if the person possesses a legal title. The philosophy behind the national forestry policy clearly strives for sustainable natural resource extraction (MINEF 1996). Consequently, Cameroon's government zoned both the permanent and non-permanent forest estates into logging concessions, agro-industrial zones, national parks and reserves, community forests and agroforestry/habitation areas. For example, CMNP is completely encircled by five logging concessions with 30-year leases, one oil palm plantation, one rubber plantation, and three agroforestry/habitation areas, which include community forests. This land-use zoning presents a clear dichotomy. While forests in the national park are meant to be completely off-limits to any type of use, forests directly adjacent to the park are being exploited for profit through extraction of forest products (Wunder 2001). Zoning has effectively isolated CMNP within a vast expanse of forest managed for extractive objectives despite the environmental and livelihood consequences.

The customary land tenure systems that exist among ethnic groups living within The Dja and CMNP landscapes are now considered to be illegitimate despite the fact that these systems of resource management mediated bundles of rights to forest, fallow, and secondary forest over generations[2]. As a result, these poor and vulnerable rural populations have lost their rights and access to

[2]These customary arrangements can be complex, involving loans and leases over varying degrees of time, and individuals and groups sharing varying levels of rights to the same land and tree resources, influenced by gender, clan, status and ethnicity (Dkamela 2001).

vast tracks of forest and are bounded within designated agroforestry-habitation areas.

The economic incentives that fuel forest zoning do not bode well for a conservation landscape strategy. Even if governments and non-governmental organizations strive to maintain conservation objectives, studies have found that the logging industry continues to exploit forests illegally, even within protected areas (World Resources Institute 2002), and that logging outside of conservation areas facilitates degradation of or increases threats to protected forest patches (Curran et al. 2004). Ironically, what does appear to be in harmony with conservation are the long-term investments of rural households in the land and forests. For example, the Beti-Buli-Fang and Ntumu peoples of southern Cameroon manage complex cocoa agroforests (Carriere-Buschenschutz 2004) and retain and manage individual trees and stands, including *Irvingia gabonensis*, *Baillonella toxisperma*, *Panda oleosa*, *Garcinia kola*, *Elaeis guineensis* and *Dacryodes edulis* for their non-timber forest products (Dkamela 2001). Under an extractive landscape strategy important trees that provide non-timber forest products and timber, like Moabi (*Baillonella toxisperma*) that grow within the boundaries of logging concessions, are felled for their timber as opposed to being retained for food or medicinal products.

Landscape zoning was not evident around protected areas adjacent to Segou, Mali. Instead, the structures and regulations intended to foster conservation serve to directly magnify social and political boundaries and alienate farmers from official natural resource management processes. Similar to the case in Cameroon, nearly all of Mali's wooded or forested land falls under the State Forest Domain as part of either the Classified Domain or the Protected Domain. The Classified Domain includes classified forests, reforested land, plantations and buffer zones. The protected domain includes unclassified natural forests, forests that provide environmental or economic services, protected tree species and any land in fallow for over ten years. The majority of farmer groups interviewed were unaware of the laws governing how they can use land and trees, but they did know that they are technically required to leave 10–20 trees per hectare to help prevent desertification. They also require permission and a permit to cut wood, to fell trees, or to clear forested land. Further, any land left in fallow for more than ten years returns to the Protected State Domain, and prior to 1995 this fallow period could not exceed five years. These regulations give farmers few incentives to invest in long-term fallows or tree planting initiatives, and establish clear social boundaries between who has power and who deserves trust.

It is important to remember that property rights to land and trees are not solely determined by the state and are not uniform across a population or within a community. Part of the complexity of the policy terrain is that at the local level gender is a critical factor in determining tree tenure and property arrangements, which consequently shape land and resources use (Schroeder 1997; Meinzen-Dick et al. 1997). In Southwest Uganda, women are primary collectors of firewood and play a principle role in agricultural production. Of particular interest in

Kabale is that women's rights to own land, to own trees, and to cut trees vary greatly between villages within the same sub-county, thus highlighting the variability of traditional use boundaries and lack of uniform transformation in response to international and national values. In Cameroon's humid forest zone women regulate access to and use of non-timber forest products (Dkamela 2001), and in Mali women are responsible for collecting firewood and fruits, but men own property and are in charge of agricultural production.

Conservation and development (in)consistencies

There is no paucity of national and international non-governmental organizations, aid agencies, government programmes, ministries, local government offices, banks and/or private companies working on development and environment issues in each of the protected area landscapes. And at the very least, each organization leaves its legacy or fingerprint on the landscape and people (cf. Mahanty and Russell 2002). Outside actors influence the faunal and floral species make-up of human inhabited landscapes, the type of land-use system that people employ, the agroforestry technologies that people adopt, and local perceptions of outside organizations, officials and one another. At an individual scale, organizations' mandates and associated decisions and practices often address important issues, however at a broader scale, patterns of contradiction emerge which present physically or socially segregating influences.

In the case of BINP, three of the non-governmental organizations within the study area promote tree planting. These organizations prioritize four exotic tree species – *Calliandra calothyrsus*, *Grevillea robusta*, *Alnus nepalensis*, and *Pinus patula*. While exotics are not always an inappropriate choice, particularly if they provide critical ecosystem functions, farmers are given little species choice and have extremely limited access to indigenous germplasm (Asare and Pedersen 2004; Frossard 2005). Therefore, institutional choices maintain the segregation between the park's natural forest ecosystem and the surrounding farmland. Interestingly, the exotic species precedent was set decades ago when colonial policies promoted extensive on-farm planting of Eucalypts (*Eucalyptus* spp.) and Black Wattle (*Acacia mearnsii*) (Uganda Forest Department 1951). Over 50 years later this legacy prevails as *Eucalyptus* and *Acacia mearnsii* are the dominant species across the farming landscape (Lindblade et al. 1998; Kindt 2002). It is a cause for concern that three of these species – *Acacia mearnsii*, *Grevillea robusta* and *Pinus patula* – are considered to be invasive species (ISSG 2004; Nyoka 2004).

Development priorities can also isolate protected forests from the surrounding landscape by altering or intensifying how people use the land. All eight of the study villages bordering Segou's classified forests have access to agricultural modernization technologies and loans, including improved crop varieties and micro-credit systems. In prioritizing agricultural development based on the production of annual crops, government agencies and non-governmental

organizations have enabled these farmers to purchase plows and oxen, and to expand cultivation within village territories that border the classified forests. While people feel that livelihoods have greatly improved, they also recognize the overall loss of forest patches within their village territories. Compared to the wide spread availability of agriculture technology and loans, only three of the villages had ever been involved in agroforestry or tree planting initiatives, and in the villagers' estimation these efforts failed due to corruption or poor extension methods. In fact, the vast majority of villages had experience with projects that had failed due to inactive extension agents, corruption, lack of local demand for the products, lack of participation, poor production, low profits, or problems with water supply. The memory for failed efforts and injustice is long, and has established clear rifts between communities and external agencies.

Recognizing social segregation is important because effective landscape conservation will require, at least implicitly, a minimum of respect, cooperation and coordination among the different actors living or operating within a landscape. Yet where institutions' policies or practices disregard or disrespect communities, they serve to build future barriers to coordinated landscape efforts. In Lomié near The Dja, an unsuccessful agroforestry and tree domestication nursery project, initiated by a major international environmental organization, caused social segregation at two levels: the project increased discord among two ethnic groups living within the same village territory; and it sowed anger and distrust toward outside organizations and their practices because it did not attempt to build local capacity and disrespected the local leadership structure (See Table 2: Divergent Views). According to villagers and a local representative of a non-governmental organization, the project lost its

Table 2. Divergent views.

"We have not continued to work with the nursery, it is abandoned and we don't really see the importance of that work now. [Tree planting] is not in our habit. A project needs to stay and not leave in one day. We have not even gotten to the results, how can we continue? One man was primarily trained. We call him the gardener. He did not show us anything and we did not pay attention." *Baka Chief, site of domestication nursery*
"I gave them the land for their nursery, but they *only* worked with the Baka. We are mad because [the project] made its fields, got its own clients and sold the trees without giving anything to the village." *Bantu Chief and "Chef de Canton", site of domestication nursery*
"[The project] were trying to bring trees of value to the whole region of Lomie. They took the five most important trees. The project was selling the trees for 1000 CFA and keeping the profit, but the project tried to give them (Baka villagers) oil palms to plant on one of their parcels. It was not accepted." *Local extension agent for domestication nursery project*
(Approximately 500 CFA/US$ 1 in January in Cameroon)

funding, but ultimately failed because its basic assumptions and priorities did not reflect those of the local communities.

Rough market flows

Landscape conservation inherently implies the linking of terrains with multiple uses and multiple values. Western conservation organizations place high value on conservation of tropical biodiversity. For rural dwellers, land-use systems and natural resources are valued for what they bring to local livelihoods, while national governments give privilege to land uses that contribute to national economies. As part of a landscape conservation approach, facilitating access to markets or diversifying existing cash crop systems with high value tree crops can add livelihood and economic value. Tree product commercialization could alleviate pressure on wild resources, if tree resources are planted rather than harvested from natural, de facto open-access, forests where they are quickly depleted or if the harvesting area is expanded and co-managed. Unfortunately, at two of the sites, the policy terrain clearly inhibits small-holder commercialization of tree products by forcing rough or illegal market transactions.

Within The Dja and CMNP study areas in Cameroon, hunting and sale of bushmeat is a key economic activity. As the majority of village groups explained, bushmeat is a quick and easy source of income that they use to meet immediate household demands like buying kerosene for lanterns, salt for sauce, medical attention for a sick family member, or clothing for children. Therefore, from a rural peasant's economic standpoint, bushmeat is a critical source of income. Present conservationist laws make bushmeat sales illegal, yet there are no easy replacement products for the average forest-dwelling farmer or hunter, which provide the same type of income. Non-timber forest products are a potential substitute. Cameroon's non-timber forest product markets are dynamic, valued between US$ 20,000 and US$ 200,000 in half year sales according to the size and location of the market (Perez et al. 2000). However farmers are faced with two bottlenecks: they have lost access to many non-timber forest products as a result of zoning, and national regulations inhibit commercialization and livelihood development. Cameroon's deputy director for non-timber forest products explained that vendors require authorization and a permit to sell any non-timber forest products, but these permits can only be obtained in the national capital from the Ministry of Environment and Forests. Even if rural farmers could afford the journey or the associated fees, the real problem is that most NTFP products have yet to be officially listed or identified, so that permits for many products do not even exist. In reality, non-timber forest markets do exist, but rural collectors and vendors have little market security and must absorb the transaction costs of enforcement and fines. In rural areas enforcement is inconsistent, with people sometimes having their products confiscated. The president of a local association of NGOs in Lomié (The Dja) recounted how forest officials had recently stopped a man on

the road and seized the bark he had collected because he did not have a permit. The same man also explained that there is a lot of artisanal fishing, and while people are not fishing inside The Dja the ecoguards still stop and take their sacs of fish, saying, 'Don't kill the fish.' Recently the government of Cameroon began considering further taxation of non-timber forest products as there has been much information collected on their value (A. Eyebe, personal communication).

Rural smallholders' efforts to commercialize forest products in the Segou area of Mali face many of the same constraints. Villages are required to purchase permits to exploit, permits to transport, and permits to sell wood and wood products. Depending on the season, the cost of a permit severely reduces the gross margin associated with the enterprises. A transport permit for one load of charcoal (six sacks) costs 3000 CFA, or US$ 5.71[3]. Sacks can sell from 700–2,000 CFA ($1.34 – $3.80). Firewood permits are sold for 800 CFA ($1.52) per 100 piece load, and each piece can sell for 35–50 CFA (+/−$.08). With average prices, one can hope to make a gross margin of 5,100 CFA ($9.71) from charcoal and 3450 CFA ($6.57) from firewood. But as women living on the border of the Classified Forest of Faira pointed out, they rarely bring an entire load to market in Segou because it is very difficult to sell a whole load in one day. Therefore, the women must pay for a second transport permit to take the wood to market again, thus reducing potential gross margins to 2100–2650 CFA ($4.00–$5.05). These calculations do not even consider the cost of permits to cut wood or to sell the product, which would further reduce margins. In many cases, women admitted that they opt not to purchase the required permits, preferring to try to avoid forest agents or to 'negotiate' with them when they are stopped. Mali's government has implemented a rural wood management policy that tries to alleviate some of these market bottlenecks by permitting groups to purchase permits collectively. The rural wood initiative was functioning in one of our study villages. This village was located beside a paved road where the wood market is supported by passing cars and trucks, but it was not evident in villages located off of the main road.

With regard to rural smallholders, market chain flows within the landscape around BINP in Uganda face few legal or opportunistic constraints. Compared to the sites in Cameroon and Mali, opportunities to engage in wood and non-timber forest product markets are limited because few people have access to the forests. Larger wood product and timber markets and associated jobs were eliminated when BINP was upgraded from an extractive reserve to a national park in 1992. Despite recommendations to permit sustainable rotational management within the multiple use zones for wood carvers of household items and black smiths (Cunningham 1996) these recommendation were not adopted. Instead, expert resource users are allowed to collect and sell limited supplies of non-timber forest products from the multiple use zones, including basket weaving material, honey, and medicinal herbs (even though it is officially illegal

[3]Approximately 525 CFA US$ 1 in February 2004 in Mali.

to sell traditional medicine in Uganda) (J.-M. Boffa, personal communication). Alternately, the government does promote private investment in plantation forestry on government land, using both exotic and native species, but this is an unrealistic option for most smallholders. Based upon interviews, the majority of farmers sell Irish potatoes and occasional trees from their woodlots to pay school fees, buy clothing, pay the graduated tax, and purchase household provision.

Legal ambiguity

Within the three countries of this study, as in many African countries, laws are often ill-defined, unclear, unknown, misinterpreted, reinterpreted, inconsistently applied, manipulated, negotiated, ignored, or changed (Ribot 1999). This reality is problematic for a landscape approach that attempts to base its structure and activities on an official policy framework or at least in being able to harmonize sets of policies that are defined and elaborated. One reason for the confusion is that people and officials are trapped by framework laws that steer legislation but lack implementation guidelines or directives; thus orders are issued with no clear description of how they should be applied. In the past ten years all three countries have implemented major forest and environmental policy changes, Uganda as recently as 2003, but the actual details of how they are to be implemented and applied is yet undefined or non-functional. At Uganda's District, Parish and even village levels, bylaws are also being implemented in a number of areas by local authorities and at the instigation of NGOs working with local people, but they are varied in intention and efficacy (Sanginga and Kamugisha 2003).

At the ground level, the definition of user-rights can be ill-defined, and access areas poorly delineated, as was evident at CMNP in Cameroon. For example, one logging company claimed that villagers are allowed to hunt and to collect forest products in their concessions, but cultivation is not permitted. A local NGO purported that hunting *and* farming are legal in concessions. In contrast, villages did not believe that they had *any* user rights within the logging concessions.

Confusion leaves ample room for 'interpretation' of regulations, typically to the forester or park guard's advantage, and power imbalances enable exploitation of people and resources. Cameroon's law permits subsistence hunting and collection of non-timber forest products, but commercialization is illegal in the case of hunting and must be regulated for non-timber forest products. Villagers complain that 'eco-guards' unfairly confiscate their bark, fish, and wild game when they were taken for subsistence purposes from areas where they do have user rights according to national law. Uganda's National Forestry and Tree Planting Act (2003) permits local communities to freely cut and take any dry wood or bamboo from a forest reserve for personal domestic use.

However, at Echuya Reserve[4], which is located within the landscape surrounding BINP, the lone forester has implemented his own policy – locals can cut dry bamboo on Thursdays for 500 Ugandan shillings[5], approximately $0.26, per stalk. Members of the minority Batwa community pay 500 shillings for an entire head-load. In his opinion, locals often fail to comply with his arrangement and he complained that people are always 'stealing' the bamboo.

Confusion, ignorance, and manipulation of laws and user rights pertaining to the Classified Forests of Faira and Dioforongo mean that a *de facto* open access situation is created; subjecting the classified forests to heavy pressure and blatant exploitation from border populations and outsiders. Local populations perceive weak surveillance, rare consequences for breaking the law, and inappropriate complicity between foresters and powerful outside interests. In response, two of the interviewed villages have tried to manifest their 'traditional' tenure claims to keep outsiders from encroaching on the classified forest. In one instance the villagers were ignored. The second village was penalized with a fine of 250,000 CFA (approximately $476) for grazing their animals in the classified forest as retribution for alerting the forest service to a 'big man's' herd that was 'parked' inside. Villages are generally frustrated and disillusioned, and freely admit that if 'others' can benefit from the forest resources then they will too[6].

When *de jure* rights create widespread uncertainty and ill-faith, local confidence in the system and potential for future collaboration are weakened. One village, on the border of the Dioforongo Forest, was recruited by the Forest Department to help them 'reforest' two and a half hectares with baobab (*Adansonia digitata*), rônier (*Borassus aethiopium*), and balanzan (*Faidherbia albida*). The villagers claim that they were supposed to be paid for their labor, but received nothing. Because reforestation and forest management are such long-term investments, it is especially important that farmers are able to trust that laws and arrangements will be fairly and consistently applied over time.

The ambiguity and uncertainty surrounding reserved species laws present particular challenges to potential agroforestry efforts. Decisions to plant or retain indigenous species on-farm, which could become an integral component of a landscape conservation approach, must be weighed against the disincentives associated with the 'reserved' species laws that all three countries have. Generally, these laws mandate government control over certain native species of trees, either restricting or prohibiting their use. The laws are designed to conserve those species because of their ecological, cultural or economic values, but in turn can discourage farmers from retaining or planting native trees.

Uganda's reserved species laws are unclear. On one hand, national and district government offices are authorized to declare species 'reserved' and issue

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[4]Echuya Reserve contains 2700 ha of bamboo (*Arundinaria* spp.) forest and 30 ha of *Pinus patula*.

[5]In 2003, 1900 Ugandan shillings were equivalent to $US 1.

[6]In their study of the consequences of transfer of property rights from traditional user groups to 'other' user groups, McKean and Ostrom (1995) found similar results.

controls if the tree has national or international importance due to its endangered, rare, or threatened status (National Forestry and Tree Planting Act 2003). On the other hand, the government has also issued a recent policy to support domestication and on-farm conservation of endangered, vulnerable, endemic or rare wild tree species (The Uganda Forestry Policy 2001). This discrepancy makes it difficult to predict farmers' rights to endangered species when trees that are planted or nurtured on-farm mature. Despite the uncertainty, reserved species like *Prunus africana* have already been domesticated and promoted by non-governmental organizations working in Kabale District on the border of BINP.

Cameroon's government has the right to declare species reserved for the purpose of conservation or regeneration within an area of exploitation (MINEF 1996). Additionally, all naturally growing trees in Cameroon belong to the State, even those trees growing on land under cultivation. The government does recognize 'planted' trees as privately owned, but only those growing on land held under a private title (van den Berg and Biesbrock 2000). Since it is rare for rural small-holders to hold legal land titles it remains unclear how the government might respond to efforts to actively domesticate and conserve (through use) key species on farmland. It also raises the question of being able to distinguish between planted and naturally regenerated trees and their products. While it may seem counter-intuitive to bring domesticated non-timber forest product trees on farm in the humid forest zone, one could argue that a demand exists given the loss of customary property rights due to 'zoning' of the forest around CMNP and The Dja. The majority of interviewed village groups in these areas are not familiar with the country's reserved species laws, but if trees of economic and environmental value were to increase in numbers on untitled farmland rural smallholders could be confronted with claims by the state to ownership of these valuable trees.

Mali's reserved species laws protect nine species, making them illegal to use, fell or partially prune, even in an individual's field. In the past, farmers in other regions have taken to uprooting the seedlings of these reserved species from their fields to keep the government off of their farms (McLain 1992). The majority of the villages interviewed in this study were aware of the law, but not of all the species that are listed.

Conclusions and recommendations

The protected area policy terrain is a complex, messy zone of competing and cooperating social and political actors making demands on the available natural resources (Cline-Cole 2001). It is not a landscape devoid of people, but one shaped by the actions of farmers, harvesters, industrial users and national leaders. Therefore, scientists and practitioners must be willing to wear multiple hats and work with a wide range of people if they hope to negotiate a path for conservation through this political territory (van Noordwijk et al. 2001b). As

this study shows, the complexity and diversity of the terrain presents significant challenges to landscape conservation strategies, particularly those that use agroforestry to help integrate the various human inhabited components. But these challenges are not immovable obstacles. There is experience in building effective pathways across the landscape, and approaching conservation through a set of principles that value people.

A first step is (re)defining and expanding some terms used in conservation discourse. Specifically, if we look at 'threats' and 'pressures' on protected areas as coming not just from direct actions on species (hunting, overharvesting) but more broadly from conflicting and weak governance, we see that simply putting into place technologies such as agroforestry will not be effective in reducing threats. We need to factor in use rights, access rights, and rights to commercialization of non-timber forest products and tree products. In addition, the agroforestry promoted has to be appropriate for food security and conservation objectives. It has to provide options for sustainable commercialization on a broad enough scale to create tangible livelihood benefits. Sustainable conservation requires not only strong conservation and forestry institutions but stronger civil society associations and more reliable markets. It can only work when people have a long-term stake in their land and resources.

Technical considerations are important as well. For agroforestry to achieve conservation and livelihood goals in landscapes around protected areas, implementers have to improve the technical quality of agroforestry interventions. That means increasing species choice and adding more indigenous species, which can be selected in a participatory process (Franzel et al. 1996). Providing a range of domestication and management technologies can meet the needs of different sectors of the population (Anegbeh et al. 2004; Mbile et al. 2004; Tchoundjeu et al. 2004). Quality germplasm needs to be made available through supporting local nursery businesses rather than giving plants away or setting up unsustainable group nurseries (Dhakal et al. 2001).

In terms of policy adjustments, conservation planners need to think through the consequences of maintaining and/or promoting different kinds of boundaries and edges. This reflection involves clarifying access to forest and tree resources within different land-uses inside of protected areas, and looking at the Forest Department's reach and mandate within farmers' fields and customary common areas. Conservation and forest managers should refrain from re-zoning or claiming land that belongs to families, clans or communities under traditional property rights regimes.

Attention is needed to governance more broadly. Greater transparency is a key ingredient in any negotiations. Ambiguity only serves to perpetuate open-access situations: it is essential to clarify policy 'gray areas' so that uncertainty and ambiguity is reduced and people can exercise their rights without risk of abuse, providing officials, managers and employees with clear guidelines, quality information and adequate resources to do their jobs, and promoting trust and good faith efforts between the different stakeholders. At each of the three sites national policies often lacked implementing laws, or were

over-ridden by conflicting laws or individual interpretations of the laws. Within the protected area policy terrain, policies and laws geared towards the conservation of protected areas overlap with policies, laws, traditions, and practices that regulate rights to land, trees, and tree products, and organization's mandates and objectives that influence activities and extension methods. This overlap can have a profound impact on how the landscape will develop and function over time by influencing how populations choose to use land and trees.

Learning from and using customary stewardship values and practices seems to be neglected in all three areas yet it has been the basis of some success in other sites in Africa and in Asia and Latin America. While stewardship customs may have degraded they can provide a basis for discussion and setting new rules. Instituting co-management of as many forest areas as possible will start the dialogue, even as we recognize that co-management is not a panacea. One approach is to give adjacent villages a special conservation designation with contractual rights and responsibilities such as used in Indonesia (Russell and Fay 2003). Other lessons on community forestry from Asia, most particularly issues of control and management of forest revenue, could be applied to Africa.

Livelihoods have to be fully integrated into planning and not an afterthought. Effort has to be made to expand and improve markets for high value tree products in the landscape. This improvement will involve not just identifying new markets but improving the functioning of existing markets, and clarifying land and tree tenure arrangements within the landscape to promote long term investment in tree crops. A viable livelihood strategy will also involve removing excessive barriers to commercialization, which hurt smallholders but not major exploiters. It is important to acknowledge that people will always strive to ensure their families' well-being and that markets will exist whether we label them illegal or not.

Finally, to create viable mosaic landscapes, much more research needs to be done to obtain a better understanding of plant-animal interactions in terms of pests and wildlife invasions (negative to farmers), and pollination and fertilization (positive to farmers) (Krauss 2004). The origin and interaction of tree species also merits consideration; particularly with regard to native, exotic, invasive, hybrid distinctions, and their ecological or anthropogenic functions. Compared to outsiders, local people tend to be less concerned with such distinctions (Rhoades 1989), instead focusing on a species' utility, of which exotic or imported species can have many (Bennett and Prance 2000; Brook 2003). But this does not downplay the fact that hundreds of exotic or alien species have become invasive in their transplanted environments, some being common agroforestry trees (Richardson et al. 2004).

This set of recommendations provides an agenda for future research and action on the part of conservation, agroforestry, policy and community institutions. Much is riding on our ability to find more sustainable, equitable and successful solutions to conservation and livelihoods in these countries which harbor both rich biodiversity and poor people.

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