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Towards productive landscapes

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Preface

The landscape approach has increasingly been promoted as a new perspective on addressing global challenges at a local level. In the face of increasing and competing claims to the land and the exhaustion of natural resources, planners, scientists and policymakers have come to realize the limitations of sectoral approaches. Integrated, landscape-level considerations have begun to supersede those restricted to specific components such as water, forestry, agricultural or development policies and programmes. Numerous international initiatives and organizations embrace the landscape approach in pursuit of productive landscapes that provide a wide range of products and ecosystem services and fulfill the social, economic and environmental requirements of present and future generations at the local, national and global level. Ambitious plans that apply the landscape approach include the restoration of 150 million hectares of degraded lands by 2020 (the Bonn Challenge).

Given this interest, and the potential impacts of such initiatives, it is important to learn from the many practical experiences in applying integrated landscape management throughout the world. We need to better understand what these experiences achieve for sustainable and fair development. We must develop adaptive approaches to achieve change in complex, multi-stakeholder settings. Productive, "triple-win" landscapes are good for food, people and ecosystems – but are there really no trade-offs between these goals? What does it mean for family farmers or small-scale foresters? Where do forests and trees fit in?

Such a context makes this issue of *ETFRN News* a timely one. It brings together 29 papers by practitioners from all over the world who highlight the successes and challenges of applying landscape approaches. They provide food for thought and, we hope, a source of inspiration for those with an interest in productive landscapes.

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Credit: Jacob L. Slusser

Towards productive landscapes — a synthesis

RODERICK J. ZAGT and JORGE CHAVEZ-TAFUR

In many parts of the tropics, landscapes are subject to unprecedented changes. Populations are growing, roads, dams and cities are being built, the climate is changing, and the demand for resources is increasing. A diversity of local, regional and global stakeholders claim a share of land and resources. Landscapes must fulfil an increasing number of functions to satisfy a broader range of stakeholders holding divergent interests. In many cases, this leads to conflict and unsustainable land use. Large areas of land lie idle, or fulfil only a fraction of their potential functions, while outsiders grab productive lands to convert them into monofunctional landscapes.

Degradation and loss of productivity affected 24% of the global land area and more than 1.5 billion people from 1983 to 2003 (Bai et al. 2008) – this is in addition to the area that was degraded and not recovering prior to that date. The World Resources Institute estimates that more than two billion hectares worldwide "offer opportunities for restoration" (Potapov, Laestadius and Minnemeyer 2011). In sum, there is a great need to manage these lands effectively and efficiently, and to combine various functions for as wide a range of actors and interests as possible within landscapes.

Concepts of integrated landscape management, or landscape approaches, have been widely embraced during recent years as a response to these challenges. Researchers, decision-makers and landscape users have come to realize that many landscapes are multifunctional, dynamic and continuously evolving under the influence of political, market, social and environmental factors. There is increasing awareness that landscape components such as forests and farms are highly interdependent. The area of mosaic landscapes where trees and forests are interspersed with permanent or semi-permanent agricultural uses is increasing.[1] There is a growing recognition that policies directed purely at forests, or purely at agriculture, have a limited ability to sustainably manage agroforestry landscapes, and to bring together local and global needs. Integrated and holistic approaches are needed.

Reconciling stakeholders' varying or even conflicting views and aspirations, and achieving a landscape that is productive for as many stakeholders as possible, is the goal of

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landscape governance. Whereas conceptually much progress has been made in understanding integrated landscape governance and management, more work is needed to put it into practice. This issue of *ETFRN News* paints a picture of the experiences and evidence gathered by practitioners from around the world in achieving and managing productive landscapes using landscape approaches. Contributors outline the successes as well as the challenges. The articles address landscape planning and management, landscape restoration, community involvement and private-sector roles at the nexus of agriculture, forests and biodiversity in mosaic landscapes, and place this in a context of climate change.

Jointly, the articles explore the following issues:

- the role of forests in mosaic landscapes;
- governance arrangements at the landscape scale and experiences with them; and
- key factors contributing to success in landscape management.

Landscapes

What exactly is a "landscape" is a matter of perspective. The European Landscape Convention (2000) — the only international policy framework that specifically concerns landscapes — defines a landscape as "… an area, as perceived by people, whose character is the result of the action and interaction of nature and/or human factors." This definition acknowledges that all stakeholders have their own view of the landscape, and pursue their own objectives within it or outside it. Since these perspectives obviously differ, the boundaries of a landscape must be flexible. Often, landscapes are formulated around a specific problem (land degradation, poverty, illegal logging) or opportunity (REDD+). It is the context — who are the stakeholders, what are the institutional and administrative mandates and how are landscape elements functionally related — that determines the boundary.

For the purpose of this *ETFRN News*, we define productive landscapes as being capable of providing not just agricultural or forestry products, but a wide range of products and (ecosystem) services and fulfilling the social, economic and environmental requirements and aspirations of present and future generations at the local, national and global level.[2] Intensified agriculture, small-scale agro-industrial wood production, small-scale logging, water capture and storage, culture and religion, ecosystem restoration, biodiversity conservation, beauty and carbon storage are local and global aspects that combine in these productive landscapes.

Landscape approaches

Achieving productive landscapes calls for a landscape approach. A landscape approach seeks to better understand and recognize the interconnections between various land uses and stakeholders by integrating them in a joint management process (Global Landscapes Forum 2014). The landscape approach is closely related to and builds on a series of concepts in rural development and research that developed over the past 30 to 40 years. Integrated conservation and development programmes, integrated watershed management, and the ecosystem approach are just a few of the precursors of the landscape

approach. Over time, people (the users of the landscapes) have moved centre stage at the expense of more technically oriented approaches (Henkemans 2008). The substantive innovations of the landscape approach have been the recognition of the need to address the complex interactions between various spatial scales, and the need to embrace the full complexity of human institutions and behaviours (Sayer et al. 2013).

Even though *landscape approach* lacks a precise definition, there is "…strong consensus on what it means, and also on its power and potential for tackling some of the most crucial […] issues of our times…" (Sunderland 2014). The response to the call for contributions to this issue revealed a variety of interpretations of the landscape approach, and of motivations to engage with it. In some cases, the landscape — and hence, the landscape approach — addresses anything with a spatial component. Many authors stress the component of collective action, or of neighbourly interactions, and the role of local stakeholders in influencing their own future. Recognizing the need for sectors such as forestry and agriculture to work together is another part of the landscape approach (Holmgren 2013). Both commodity farmers and conservationists feel that the "landscape" starts where their ability to address and influence actors and the environment stops, which is more or less at the border of the farm and protected area, respectively. In those cases the landscape approach is seen as converging with governance.

Within this range of interpretations, common elements emerge. A fundamental assumption underlying landscape approaches is that it is possible to align local and global interests, short-term and long-term interests and public and private interests. Finding solutions requires collaborative decision making, adequate representation of interests that need to be addressed in the landscape, a deep understanding of the landscape and of the relations between its various components, continuous learning and adaptation, and institutions that go beyond sectoral interests. These features are embodied in the Principles for Forest and Landscape Restoration (Sayer et al. 2013), which emphasize ten features of collaborative decision making to enhance local livelihoods and reconcile competing land uses (Table 1). Scherr, Shames and Friedman (2013) operationalize landscape approaches in the following terms:

- shared or agreed management for multiple objectives;
- field practices that provide multiple benefits;
- spatial arrangement of landscape features designed to maximize synergies;
- collaborative community-based decision-making and action; and
- policies and markets that incentivize synergies.

Table 1. The ten principles of forest and landscape restoration

1. Continual learning and adaptive management	6. Negotiated and transparent change logic
2. Common concern entry point	7. Clarification of rights and responsibilities
3. Multiple scales	8. Participatory and user-friendly monitoring
4. Multifunctionality	9. Resilience
5. Multiple stakeholders	10. Strengthened stakeholder capacity

Based on: Sayer et al. 2013

Overview of the articles

Section 1 introduces two concepts that shape scholarship and debate on landscapes. Kusters (1.1) outlines the sharing-versus-sparing debate, which represents two dominant but contrasting schools of thought for reconciling the objectives of food security, rural development and biodiversity conservation. Landscape approaches seek such reconciliation, but it makes a big difference to people and landscapes whether this is done by separating production and conservation functions in the landscape (sparing) or by combining them (sharing). Van Noordwijk and Sunderland (1.2) delve into the forest transition curve, which describes how nations move through a phase of deforestation as they develop, followed by a period of stabilization, and then an increase in forest area as they reach a certain level of wealth. Van Noordwijk and Sunderland introduce a series of six key questions that jointly assist stakeholders in developing collective responses to landscape problems.

Section 2 gives examples of large-scale and long-lasting programmes that support stakeholders in jointly addressing problems in the landscape. FAO's Forest and Landscape Restoration Mechanism (2.1) provides a facilitating, knowledge sharing and piloting approach, while the long-running International Model Forest Network highlights how knowledge generation and exchange across multiple scales have successfully fostered multi-stakeholder governance arrangements (2.2). The COMDEKS project (2.3) focuses on how to engage communities in landscape projects, and describes methods to translate this engagement into setting priorities and taking collaborative action.

Sections 3 and 4 explore multi-functional landscape management. The cases in Section 3 share complex land-use situations: many actors, many different land uses, and a wealth of social, cultural and political histories. Examples of bottom-up or community-driven approaches (3.5; 3.7; 3.8) are found, as are more top-down or governmental (3.1; 3.6) approaches.

The articles in Section 4 cover much of the same ground, with a stronger emphasis on forests and trees, and on forest landscape restoration. They range from relatively small scale, as in examples of Analog Forestry (4.1), to the scale of a large jurisdiction (4.4, in Rio Grande do Sul, Brazil). Unlike the articles in Section 3, the examples often deal with situations in which land tenure is secure, such as plantations (4.2; 4.4; 4.6; 4.8), individual land properties (4.9; 4.10), or secured as part of the project (4.7). The articles focus on the need to fit certain land-use activities into the wider landscape and gain support and legitimacy among local stakeholders.

Section 5 addresses some of the cross-cutting issues which are critical to implementing landscape approaches: strategies to mobilize finance and investment (5.1; 5.2), certification (5.3), and incorporating cultural landscape visions (5.4), High Conservation Values (5.5) and social safeguards (5.6) in governance and planning processes.

Diversity of contributions

In all, the cases presented cover 21 countries, from Asia (9 cases), South America (9), Africa (7), Central America and the Caribbean (6), and Europe (1). Brazilian and Indonesian cases dominate, with five experiences using landscape approaches. They cover aspects of forestry, agriculture, pastoralism, tourism, conservation and energy. And although landscape approaches by definition are multi-stakeholder, in most studies, one stakeholder takes the lead. NGOs are often seen to be the project initiator: a grassroots NGO as in article 3.8 (Flores, Indonesia), or an international NGO as in 3.3 and 4.1. A private company is usually in the lead where plantations and their role in landscape development are involved; e.g., 4.2 and 4.6. Government-initiated landscape programmes with donor support are also represented, with cases from Ethiopia (3.1 and 3.6); the remainder is made up of programmes initiated by technical experts or researchers.

What these cases show is that landscapes have flexible boundaries defined by the issues at hand. In the cases presented, landscapes vary from tiny (three cases describe experiences in areas smaller than 100 ha) to very large. Eight cases describe landscape initiatives that extend over more than 100,000 ha and affect thousands of people (e.g., article 3.6 from Ethiopia, with 194,000 households in a landscape covering 180,000 ha).

The role of trees and forests in landscapes

Van Noordwijk and Sunderland (1.2) review the current state of knowledge regarding the dynamic forest-agriculture interface, as well as policies and practical ways to influence the extent of tree cover in agricultural land. They interpret the forest transition model in not just temporal but also spatial and institutional terms, and use it to summarize information about deforestation, reforestation and the role of forests and trees in mosaic landscapes worldwide. Although they suggest that the positive and negative consequences of increasing tree cover are well understood, the question of whether forest and tree-rich landscapes are more effective in achieving the triple objectives of food security, climate stability and conservation is hard to answer based on the contributions in this issue. The articles provide practical support for the view that such landscapes compare favourably with those that are degraded by overgrazing and erosion, but there is no systematic evidence, and no specific instruments and tools, to assess how different forest and tree-rich landscapes compare with each other.

Rationales for trees in the landscape

There is a strong convergence of ecological, environmental and cultural rationales to retain and increase tree cover in tropical landscapes. This provides many reasons for landscape programmes to increase tree cover, as do rural livelihoods and economic development, based on the practical value of trees and forests for timber, for fruits, fodder, feed and fibre, and for stabilizing slopes and riverbanks, pollination and pest control. Many articles provide examples and rationales for planting trees, woodlots and forests as a component of integrated agroforestry strategies. Analog Forestry (4.1) goes the furthest in aligning development and conservation interests by restoring a full complement of forest functions that mimic the original forest structure with useful

species. Requirements imposed by the Brazilian Forest Code to protect riparian belts on private properties are made acceptable to smallholders by integrating these areas with the production of yerba mate (4.10). The large-scale development of forest plantations may be driven by economic motives, but is justified by important environmental co-benefits of forests, such as restoring degraded areas, storing carbon, protecting biodiversity and bringing benefits for local people in the form of employment and business opportunities (e.g., 4.2 and 4.4). Erosion and siltation of watercourses and lakes is countered by the planting of trees in 3.1 and 3.5–3.8; soil quality is restored by trees in 4.4, 4.5 and 4.9.

Conservation organizations and protected area managers provide a slightly different rationale for considering forests and trees at the landscape level: to increase the effectiveness of protected areas by the development of forested corridors in the landscape. Corridors increase landscape resilience by favouring the movement of plants and animals and reducing the risk of inbreeding and local extinction in isolated forests and parks. Rather than a sharing strategy, this can be interpreted as the optimization of a sparing strategy, whereby conservation (in protected areas) and development (outside the protected areas) are functionally separated, and corridors are integrated into rural landscapes as much as possible. Examples are provided in 2.2, 3.3, and 4.1. The opposite approach is to manage landscape conversion for plantations in such a way that corridors and connectivity are maintained, for example, by identifying and protecting High Conservation Value (HCV) areas. Purwanto et al. (5.5) conclude that even though HCV assessment is an appropriate instrument, isolated HCV identification in separate management units fails to achieve connectivity at a landscape level. Articles 4.2 and 4.6 describe how corridors of native vegetation are part of the design of sustainable plantations at a large scale, while article 5.2 shows the financial challenges of realizing corridors in soy landscapes.

Local and global functions of forests

It remains a question whether the integration of forests and trees into multifunctional mosaic landscapes — as exemplified in the articles in this issue — will be sufficient to safeguard all the functions of forests. Even well-managed, intensely used forests that are integrated into landscapes will still be degraded forests with at most moderate biodiversity (Alkemade et al. 2009) compared with the primary forests that contain much of the world's biodiversity. To some extent, this is also true of the carbon storage function of forests, which is much greater in old-growth forests than in degraded forests. The regional hydrological function of forests, whereby water from forest evapotranspiration drives rainfall in distant regions, is another example of a function that is potentially performed better by large forest blocks than by mosaic landscapes.

Institutional arrangements in the landscape

Several authors (e.g., 2.2) stress that good governance is the basis of successful landscape approaches. It is less clear to what extent integrated landscape management can and should be achieved within existing governance frameworks, or whether it is possible and desirable for stakeholders to work around formal governance structures and design

flexible solutions tailored to their specific needs. The articles in this *ETFRN News* provide examples of both strategies.

Some authors advocate a jurisdictional approach (3.1; 5.3); Rodrigues de Aquino and Griffin (3.1) state that only jurisdictions can make the policy decisions that are needed, at the scale that is needed, and with the mandate that is needed. Others stress the strength of multi-stakeholder collaboration and organization, and the capacity of new institutions to organize and represent grassroots participation in decision making around specific problems. This does not exclude local and central governments, but instead engages them in flexible arrangements. It also removes the dynamics generated by short-term political imperatives (and of government staff turnover) from the long-term horizon of landscape decision making and management (3.8).

The lessons learned by two large programmes that have embraced landscape approaches provide important insights. Based on experiences with the COMDEKS project, Salvemini and Remple conclude that effective governance of production landscapes calls for representation of multiple stakeholders within an integrated landscape plan. This does not necessarily require the establishment of formal state institutions at the landscape level; mechanisms that create connections and communities of interest across the landscape may be more effective (2.3). The Model Forest approach (2.2) provides such a mechanism: Model Forests put in place an operational environment in which choices and trade-offs are discussed by the stakeholders affected by land-use decisions. Based on these experiences, Ho et al. (2.2) advise that such a governance environment should focus on creating a forum for exploring issues at multiple scales and negotiating creative solutions, rather than directly addressing land ownership or administration. Yet, many landscape management experiences described in this issue do consider tenure as a critical issue and assert that changing it is a condition for improving landscape management; for instance, in securing the supply of wood fuel in Madagascar (4.7).

Widyanto et al. (3.8) describe the gradual evolution of bottom-up landscape-level institutional arrangements in Flores, Indonesia, and highlight their potential to involve stakeholders in decision making. At the same time, the authors recognize that informal and flexible arrangements may suffer the same challenges of equitable representation and participation faced by formal institutions, and that re-inventing governance may even lead to further marginalization of vulnerable groups.

Enforcement and sanctioning of agreements is crucial to the effective implementation of any arrangement, whether it involves landscape planning and management-based mechanisms or market- or incentive-based mechanisms (5.1). Flexible informal arrangements may lack the legitimacy and mandate to enforce agreements (according to 3.1), although Deichert, Krämer and Schöning (3.6) describe how this is possible within informal institutions: user groups who collaboratively manage watersheds monitor, ensure compliance with the rules and fine rule-breakers.

Defining success in landscape approaches

What are the benefits of integrated landscape management as described in this issue? Few articles operate a systematic framework against which to assess results (3.3; 3.5; and 4.7 are exceptions), yet together the articles describe a wide range of benefits to stakeholders that contribute to our understanding of the benefits and impacts of landscape approaches.

As landscape approaches seek to bridge global and local interests, and public and private ones, it is relevant to examine how authors express the benefits of their projects, and whether they do that in integrated and holistic terms. Authors were not requested to systematically inventory benefits, but this overview highlights benefits considered important by authors (Table 2).

Table 2. Overview of benefits of landscape management cited by authors

Private benefits	increased income
	higher agricultural production
	more diversified sources of income
	reduction of time spent on tasks
	improved food security
Collective environmental benefits	reduced degradation
	better ecosystem functioning
	better conservation of biodiversity
Collective social and economic benefits	better collaboration between stakeholders
	better collaboration and planning by government
	improved recognition of stakeholders and their issues by government
	additional business opportunities
	a more explicit understanding of trade-offs

The benefits that are most frequently mentioned are those that accrue to individual stakeholders as a result of better resource management. Increased income was listed in seven articles, but likely applies to more cases. Often, when these benefits are mentioned it is in association with vulnerable groups such as poor people, landless people or women, rather than with stakeholders in the entire landscape: more equity in participation and benefit sharing is a stated objective of many initiatives.

Benefits at the level of the community, the landscape or the government (Table 2, second and third sections) are much less frequently mentioned. A single case mentions “a more explicit understanding of trade-offs” (Dewi et al., 3.2) as a benefit in a project of land-use scenarios that requires explicit modelling of these trade-offs. These types of benefits are at the heart of the landscape approach as it seeks to navigate and negotiate such trade-offs.

Truly large-scale (regional to global) and public benefits are rarely mentioned, which may be understandable given their characteristics and intractability. Global concerns (loss of biodiversity, climate change) often provide the rationale for starting an initiative (4.8; 5.1), so the dearth of references to these related benefits in the articles is remarkable.

A framework for assessing success

Some authors note the lack of a framework to assess the outcomes of landscape interventions. Deichert, Krämer and Schöning (3.6), for example, note that "there is a lack of clarity about actual outcomes, and how to achieve and measure them in terms of social, ecological, economic and climate change benefits." The authors blame this on insufficient harmonization of interventions among development partners, but truly adaptive landscape management should engage all actors in monitoring and evaluation of their efforts. Article 2.3 shows how a systematic set of indicators helps stakeholders in identifying issues in the landscape and prioritizing action.

In fact, most initiatives covered in this issue seem to assess success at two levels. The first is quantitative, in terms of short-term and private benefits to a subset of stakeholders (vulnerable groups such as poor people, landless people or women). In many respects, this bypasses a landscape vision of issues, which also seeks to address public, long term and large-scale interests. The second, more qualitative, benefit that seems to be most valued in landscape initiatives — but is not mentioned explicitly by authors — is social cohesion, or sense of community. Increased collaboration between stakeholders in the landscape unleashes energy, learning and ingenuity to solve problems and undertake collective action. This seems to be the essence of the landscape approach that emerges from these articles — even if it may not be clearly related to the actual challenges that need to be solved.

Contributing factors

The articles provide insights to the factors that contribute to the success of integrated landscape management efforts. In many cases, these can be linked to the ten principles for forest and landscape restoration formulated by Sayer et al. (2013) and summarized in Table 1. Below, a few aspects are highlighted; the articles identify many more enabling factors for landscape approaches.

A common concern entry point

The key feature of the articles in Section 3 is the collective sense of urgency provided by serious landscape problems. In all cases, a significant problem — climate change (3.1–3.3), serious land degradation (3.1; 3.4–3.6), loss of productivity (3.3), water shortage or pollution (3.4; 3.8), or loss of forests and biodiversity (3.8) — provides an impetus for local stakeholders and external actors to get together, negotiate and agree on collective action. This contrasts with cases where a dominant, resource-secure and financially and technically competent land user – e.g., in 4.2, 4.4, 4.6, 4.8 and 5.2, is associated with industrial-scale plantations for timber, soy or oil palm. In these cases, the landscape approach does not take the form of a process for collaborative decision making, but for

increasing the legitimacy of land use and providing positive social and environmental benefits in the wider landscape.

Multiple stakeholders

The participation and involvement of stakeholders is key, not only as beneficiaries, but as primary decision makers (2.3; 3.4). In most articles, the term *stakeholders* is practically understood as local stakeholders; this is linked to an agenda of equity, power and social justice (e.g., 5.6). Social cohesion and dynamism of stakeholder groups and landscape users in general, and trust between stakeholders (especially between government and local stakeholders) are cited as important factors contributing to the success of landscape approaches. Equally important are those mechanisms that safeguard the participation of the most vulnerable groups: women, ethnic minorities and landless people (2.3; 3.5; 5.6). Land-use planning is a suitable entry point for stakeholders in decision making, as shown by Dewi et al. (2.3). A focus on local actors raises the question of how and to what extent the legitimate stakes and interests of non-local stakeholders are being represented in landscape-wide decision-making processes. These non-local stakeholders include beneficiaries of global goods, distant consumers such as urbanites, and (central) governments, among others.

These "outsiders" in landscapes often play simultaneous roles of participants and arbiters. In the case of donors or international community representatives, they may represent the interests of regional or global stakeholders who have a stake in the landscape, which they express in the form of financial and technical assistance or payments for goods and services. They may also operate as impartial facilitators who catalyze collaboration and action among local stakeholders. These functions are not always compatible, but they are frequently combined – for instance, in REDD+ projects. The use of funds to express a voice in landscape decisions clearly illustrates the dual role that exists for external actors, and the tension that this creates between local and external interests in the landscape. Madrid and Deschamps (3.4) make the point that instruments such as REDD+ and PES, while useful and necessary to finance activities in the landscape or facilitate stakeholder collaboration, should emphasize co-responsibility rather than impose outsiders' views on local problems.

Supply chains present a somewhat different approach to landscapes – they can be seen as mechanisms that make external consumers stakeholders in effective landscape management through their link with landscape users (suppliers). Supply chains are increasingly used to provide market incentives for better landscape governance and management. Responsible supply chains thrive on good governance, sustainable practices and balanced stakeholder interaction within landscapes; they can also catalyze the emergence and functioning of such mechanisms, as shown in articles 3.3, 4.2, 4.6, 4.8 and 5.2. Some authors highlight the limitations of a supply-chain approach to landscapes, and feel that governments should set and enforce acceptable baseline levels for sustainability (4.8). Buyers of commodities are flexible in their choice of suppliers and sourcing areas. They can impose high standards in order to comply with sustainability standards, but this works

well for landscapes only if buyers are able to bring their suppliers along in a process of improvement. From a landscape perspective, there is no benefit to achieving a "green" supply chain by excluding poorly performing suppliers from a supply chain, or by leaving the area in order to satisfy buying needs elsewhere. An example is provided in 4.2, where owners of properties that were deforested after 1994 are excluded from a forest restoration programme in order to safeguard FSC certification. This approach does not bring back forests on deforested lands.

Bridging scales by linking short-term income with long-term benefits

Many articles stress the importance of demonstrating immediate and tangible benefits to local stakeholders in landscape projects (e.g., 4.3), and of linking short-term income to long-term benefits (3.5; 3.6; and 4.5). Madrid and Deschamps (3.4) recommend that project proponents "tailor actions to various scales, always considering how to take advantage of objectives and strategies developed at other scales." Van Noordwijk and Sunderland (1.2) caution against the "direct" translation of global objectives (e.g., climate change mitigation) to local objectives (e.g., planting trees). Local actions should appeal to local perceptions of problems and contribute to local livelihoods, but they should be designed in such a way that they also help achieve goals formulated at different scales.

Tenure and resource security

Resource security emerges as a key factor in landscape approaches. Resource insecurity favours short-term land-use practices that are inappropriate. Even though secure access to resources does not guarantee longer-term management visions and sustainable practices (e.g., Busch and Ferretti-Gallon 2014), it is difficult to envisage how sustainability can be achieved without it. As previously noted, the issues in landscapes dominated by large-scale private properties are very different from those in landscapes where tenure is contested and unclear. According to Silva (4.2), "With the tools available for [addressing] environmental impacts, there should be little reason for plantation forestry to cause ecosystem degradation," implying that tenure provides the security to solve the managerial constraints to sustainable land use (leaving many other issues to be addressed). Many articles describe how tenure security contributes to sustainable land-use practices in complex, smallholder-dominated mosaic landscapes (e.g., 3.4; 3.5; 3.6; 4.7).

Enabling environment

Many articles touch on the importance of an enabling environment for landscape approaches. This can take the form of an adequate legislative basis that recognizes participatory approaches (4.3) or a governance model that is representative, participatory, transparent and accountable, and promotes collaboration among stakeholders (2.2). Approaches that connect various sectors and institutions (2.1; 2.3), or link supply chains and local land users (3.3; 4.8) also contribute to an enabling environment.

Supporting landscape approaches

Notwithstanding the dilemmas associated with the involvement of outsiders in landscapes, outside support — including that provided through supply chains — is critical to the success of many landscape initiatives. Table 3 lists factors beyond finance and investment that outsiders and external actors contributed to landscape initiatives in the articles.

Funding and investment capital can cover the up-front costs of collaborative decision making and integrated landscape management; this can come from public sources (3.1) and private sources (3.3). McGuire (2.1) describes the Forest and Landscape Restoration Mechanism, which is set up to support and facilitate landscape processes. Public sources such as REDD+ (3.1) and official development assistance (3.5) are generally used to improve enabling conditions for integrated landscape management. It is unclear whether business models exist to entice private investors into financing integrated management at a landscape scale. The private sector, in principle, can generate large investments that contribute to restoring landscape productivity (commodities), but this does not automatically equate to investment in integrated, multi-functional landscapes – and this may not be the private sector's prime responsibility. It can, for example, invest the price premiums generated in markets for sustainable products (e.g., cocoa 3.3, soy in 5.2) or in voluntary carbon markets (4.5) in improving the enabling conditions for integrated management. Article 5.2, however, seems to conclude that it is not productive to look to the supply chain alone for financing mechanisms that offset the cost of biodiversity conservation. Articles 5.1 and 5.2 examine how various sources and forms of external financing can be combined and mobilized to offset costs to local stakeholders and finance investments in alternative land-use practices.

Table 3. Outside support provided to landscape initiatives

Technical assistance (e.g., developing woodlots, extensive ground works, reorganizing value chain, technical tools)	3.2, 4.7
Capacity building	numerous articles, and specifically in 4.9
Support to group formation and social organization	3.3; 3.6; 3.8; and several others
Awareness creation	3.6

Conclusions

The essence of landscape approaches that emerges from this issue is social cohesion: the sense of community and empowerment that is found in achieving mutual understanding and collective decision making. The catalyst for local stakeholders and external actors to come together is often a significant environmental problem that is grave enough to require negotiated solutions that create better outcomes for everyone. Stimulus and support from external actors in the form of finance and independent facilitation is usually needed to make this happen.

Landscape approaches tend to lead to a process whereby long-term, usually environmental, benefits are tied to the delivery of private local benefits. An important assumption is that there are combinations of short-term actions and incentives that provide these long-term and/or global benefits. However, to what extent will restoration of forest patches, or the establishment of corridors and other mitigating actions resulting from landscape negotiation lead to substantial impacts on environmental problems at scales beyond the landscape? To what extent will improvements in agricultural practices lead to food security at this scale? A similar problem of scale also exists within landscapes. Landscapes are more than the sum of their components – there are also interactions to be managed. This suggests that some action must address social and environmental landscape features that are not directly linked to private interests: diversity, connectivity, equity, governance and others.

Other challenges are how to institutionalize the flexible arrangements that emerge and how to deal with non-local stakeholders. What options exist to formalize negotiated outcomes in governance frameworks that have the legitimacy and mandate to enable implementation, monitoring and enforcement of decisions? In initiatives that are essentially local, what is the best way to represent the interests and concerns from scale levels beyond the landscape? And how can these be expressed without being perceived as top down interests overriding local issues — by means of voice, vote or dollars?

The practical experiences described in the articles in this issue provide room for optimism – for landscapes and for the contribution of forests and trees in securing the livelihoods of the people who inhabit them. There is a continued need for people engaged in landscape approaches to put their experiences together, compare them and look for general patterns that explain why certain approaches work and others fail. Many questions need to be answered. A clear language is needed to communicate about landscapes and landscape approaches, and to simultaneously help efforts to monitor and evaluate landscapes. Fortunately, there are many instances where foresters, farmers, pastoralists and other land users have taken charge and are jointly shaping the landscape they inhabit. This helps the global community to address the challenges of climate change, biodiversity loss and food insecurity.

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Endnotes

1. More than 1 billion hectares, or almost half of the agricultural land in the world, has tree cover of more than 10 percent; about 7% (167 million ha) of land classified as agricultural has even more than 50% tree cover (Zomer et al. 2014).
2. Organizations and researchers use a range of terms and concepts that more or less overlap with *productive landscapes* and fall within the scope of the current *ETFRN News*: sustainable landscapes, climate-smart landscapes; resilient landscapes; eco-agriculture landscapes and many others. See also Scherr, Shames and Friedman 2013 for a review of terms.

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Section 1

Landscape concepts

Photo credits, Section 1
p.1 Open land in Ketapang, Indonesia. Yanuar Wicaksono
p.3 The landscape of the Krui area of Sumatra includes rice paddies, agro-forests and natural forest. Koen Kusters
p.9 A productive landscape at the border of the Aberdares National Park, Kenya. Meine van Noordwijk
p.12 Agriculture/forest transition at the edge of Gunung Halimun Salak National Park, West Java. Terry Sunderland

1.1 Sharing or sparing?

KOEN KUSTERS

In recent years a fierce debate has unfolded among scientists on how to best combine the goals of biodiversity conservation, rural development and global food security. Some argue for investments in high-tech industrial agriculture. This would lead to more efficient land use, allowing for increased food production while sparing land for wild nature. Others argue that agriculture and nature need to share the same space, stressing the need to invest in smallholder, environmentally friendly farming. This article reveals that the so-called sparing-sharing debate is a discussion that is heavily laden with values, and that the landscape approach may offer a practical solution.

One objective, two approaches

One approach to meeting the rapidly increasing global demand for agricultural products without causing biodiversity loss is to further intensify and mechanize agricultural production. It is claimed that this will not only raise production but also protect biodiversity, as it ensures more efficient use of scarce lands. It implies setting aside and giving protected status to as many intact ecosystems as possible, while intensively growing crops in industrial agricultural systems on the remaining land. Crop diversity in these farming systems is usually low, individual fields are large, and there is heavy reliance on external inputs.

A LANDSCAPE APPROACH HELPS TO UNDERSTAND THE MULTI-FACETED SERVICES PROVIDED BY NATURAL FORESTS, PLANTED TREE-BASED SYSTEMS AND AGRICULTURAL FIELDS.

But this industrial agriculture has its critics. They point at the negative consequences, such as the heavy use of agrochemicals and farmers' dependency on large corporations. They also emphasize that much of the world's biodiversity is found outside of nature reserves and that the habitats of several species extend over large areas, including both reserves and agricultural land. Moreover, promoting intensification does not necessarily increase the amount of land spared for nature; when intensification attracts a growing number of |migrants and creates new business opportunities it may have the opposite effect. The

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critics of industrial agriculture call for an alternative model of agricultural development, based on environmentally friendly smallholder farming and on integrating rather than segregating agricultural production and biodiversity conservation. Such environmentally friendly agricultural landscapes are heterogeneous and typically include native vegetation. Agricultural fields are relatively small, the diversity of planted crops is large, and the use of agrochemicals is limited.

Food security

With the world's population expected to reach 9.6 billion in 2050 (United Nations 2013), the security of people's access to food is a major global challenge. This has given rise to the idea that the further development of high-tech intensified agriculture is indispensable to achieve the necessary increase in agricultural yield. There are, however, several arguments against industrial agriculture as a means of achieving global food security:

- Hunger is not a result of too little production or yield. Although about one billion people are classified as "hungry," an equal number of people are overweight (FAO 2009; Pinstrup-Andersen 2006, cited in Sunderland 2011). Food insecurity is first and foremost a problem of unequal distribution. Moreover, there is widespread and unnecessary loss of food. The Institution of Mechanical Engineers, for example, estimates that 30–50% of all food produced on the planet is lost before reaching a human stomach (Imeche 2013).
- When farmers no longer produce a variety of products for local trade and subsistence purposes they become increasingly dependent on purchased food products. An increasing number of people in the world suffer from deficiencies in micronutrients due to high consumption of cereals and simplification of diets (Frison et al. 2006, cited in Sunderland 2011).
- Much of the current expansion of large-scale industrial agriculture is uncontrolled, due to a lack of appropriate legislation and spatial planning to safeguard the interests of local communities and the local environment. It favours land concentration in the hands of a few large-scale corporations that produce crops for export, and negatively affects local food sovereignty.
- Conventional intensification depends heavily on the use of pesticides and chemical fertilizers, which have a range of side effects on agro-biodiversity. These include negative effects on natural pollinators and the natural enemies of pests. The biodiversity in agricultural landscapes is also important as a pool of genetic material.
- Industrial agriculture depends on fossil fuels, which compromises its viability in the longer term. Producing food for more than nine billion people with conventional agriculture will quickly exhaust global oil reserves (Tittonell 2013). In addition, the high costs of external inputs make local farmers dependent on retailers, money-lenders or state subsidies (United Nations 2011).

The productivity question

A frequent argument against small-scale, environmentally friendly agriculture is that it yields less than industrial agriculture, and is therefore not able to feed the growing world population. It has been claimed that efforts to make agricultural practices more environmentally friendly will ultimately compromise yields and global food security (Godfray 2011). Sir David King, President of the British Association for the Advancement of Science, even claimed that by supporting indigenous and organic agriculture and rejecting modern technologies (such as genetic technologies), Western NGOs are effectively hampering the improvement of the lives of millions of people in Africa (Henderson 2008). According to such critics, the rich and well-fed consumers of the developed world are blinded by romantic nostalgia for the traditional farming lifestyle of the past.

Others argue that high yields and high biodiversity may very well coexist in smallholder systems, and that smallholder systems may even be more productive than large-scale industrial systems. Several studies suggest that technologies with low external inputs in diverse agricultural systems improve productivity (Pretty et al. 2006; Badgley et al. 2007; Foley et al. 2011). It has also been stated, however, that these studies do not compare alternative technologies against appropriate control systems, i.e., organic best practices versus conventional best practices (Phalan et al. 2011).

A religious discussion?

The debate about rural development in forested landscapes is polarized. The range of opinions is partly explained by differences in criteria and levels of analysis. This in turn is related to professional backgrounds and conceptual models. Fischer et al. (2008) convincingly argue that the land-sparing view is based on a binary view of landscapes, with little concern for ecological interactions between nature and agriculture, while the sharing argument is based on a conceptual model that emphasizes the interactions between people and nature in complex social-ecological systems.

Values and world views also affect the discussion. For example, the sharing view is based not only on factual arguments (e.g., about functional biodiversity), but also on the intrinsic value that its proponents attribute to diversity in landscapes and the idea that people need to be reconnected to their food and natural surroundings. Furthermore, many proponents of environmentally friendly farming, implicitly or explicitly, criticize the growing influence of corporate entities and reliance on modern technologies, while the advocates of further intensification of agriculture place much greater trust in markets and technological progress.

Ideas about urbanization also differ. During interviews with international experts conducted as part of a study for the Rich Forests initiative, Louise Fresco[1] noted that "we should not forget that there is a huge exodus going on – young people are leaving the rural areas in great numbers...These people are looking for livelihood security outside of agriculture" (Kusters and Lammers 2013: 16).

Referring to the same phenomenon of rural-urban migration, Ivette Perfecto[2] said: "...the majority of the poor are still living in rural areas and ... many of the people who live in cities have been pushed out of the countryside because of agricultural policies that favour large-scale agriculture" (Kusters and Lammers 2013: 17). Fresco and Perfecto have different interpretations of what is happening on the ground and where things are (or should be) heading. Where Fresco envisions specialized rural areas producing products for growing urban populations, Perfecto envisions multifunctional landscapes that include human settlements, agricultural fields and natural vegetation, producing food for local and regional markets.

Notions about what development should look like are influencing the sharing-sparing discussion. In some ways the debate resembles a religious discussion, with believers and non-believers. In any scientific debate on the future of rural development the underlying conceptual models, values and world views should be made explicit. Only then can scholars, policymakers, practitioners and activists have a constructive discussion that allows them to express their ideals while distinguishing these ideals from scientific facts. At the same time there is a need for a more practical perspective – one that does not ignore the great variety of landscapes, ideals and interests that exist in the real world, but instead regards this diversity as a starting point. The landscape approach might provide that perspective.

Looking at the landscape

The sharing-sparing dichotomy simplifies a complex reality of diverse landscapes and landscape dynamics. Moreover, many of the world's agricultural landscapes are somewhere in between the two ends of the spectrum. The future of rural development is not a matter of either/or. The appropriateness of various land-use options (large-scale or small-scale, high-input or low-input, polyculture or monoculture, etc.) depends first and foremost on the features of the landscape: the local ecology, socio-cultural context and history (Fischer et al. 2008). This includes the area's topography, historical land ownership patterns, current land uses, presence of endangered species and vicinity of urban areas, as well as societal preferences and governance arrangements. When considering the options for rural development, costs and benefits should therefore be assessed at the level of the regional landscape.

The term *landscape approach* refers to interventions in rural areas that are aimed at optimizing relations among the various land-cover types, institutions and human activities at the spatial scale of the landscape. It is meant to identify – for instance, through multi-stakeholder negotiations – the interventions and policies that best reconcile the often conflicting goals of different stakeholders. The navigation of trade-offs at the landscape level is not merely a technical issue, but a long-term multi-stakeholder process that is likely to require social and institutional changes (Sayer 2009).

Working at the landscape level means that there is a need to step away from any blueprint for agricultural development. A landscape approach helps to understand the multiple and multi-faceted services provided by natural forests, planted tree-based systems and

agrarian systems. It also helps to recognize the interactions of these systems, and how they relate to local livelihoods and development aspirations. It is at this spatial scale that the implications of various land-use options can best be understood and the trade-offs between conservation and development objectives can best be negotiated.

For more information

This article is based on a study conducted for the Rich Forests initiative, which is a partnership between the Amsterdam-based NGO Both ENDS and two international NGO networks: the Non-Timber Forest Products Exchange Programme for South and South-East Asia (NTFP-EP) and the International Analog Forestry Network (IAFN). Rich Forests aims to contribute to the conservation and restoration of forest resources and the promotion of sustainable rural livelihoods. The study's full report (Kusters and Lammers 2013) is available at www.richforests.org.

Endnotes

1. Professor Louise O. Fresco is University Professor at the University of Amsterdam. She was appointed President of the Executive Board of Wageningen University & Research Centre as of 1 July 2014.
2. Ivette Perfecto is Professor of Ecology and Natural Resources at the University of Michigan, Ann Arbor, Michigan.

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1.2 Productive landscapes: what role for forests, trees and agroforestry?

MEINE VAN NOORDWIJK and
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Introduction

It is hoped that in 2015 world leaders will agree on a set of Sustainable Development Goals and set targets for progress on poverty reduction, security of water, energy and food, climate resilience, livelihoods, governance and gender equity. These goals can be met at least in part by productive landscapes that include forests, trees and agroforestry (Mbow, van Noordwijk et al. 2014). An important part of the agenda are the opportunities and challenges of balancing trade-offs in managing for productive and sustainable landscapes that provide integrated local, national and global benefits (Sunderland, Ehringhaus and Campbell 2008).

The international research community has made significant efforts to increase understanding, deliver information and engage with partners who link research to action (Clark et al. 2011). For instance, the Consultative Group on International Agricultural Research (CGIAR) Research Program on Forests, Trees and Agroforestry (FTA)[1] pays explicit attention to these issues at the landscape scale. This article outlines the basic concepts behind productive landscapes and presents hypotheses on positive and negative tree cover change. It also introduces the research approach, toolboxes and the local and international partnerships that have been developed.

Considering the landscape as a system can build on a rich experience in watershed management and biodiversity conservation.

Multiple interests in productive landscapes

The current interest in the landscape approach has been articulated in the context of watershed management and biodiversity conservation, where protected areas cannot be managed in isolation without an understanding of the influence of the landscape "matrix" (Pfund et al. 2011). The landscape approach is also being advocated to deal with climate change (IPCC 2014; van Noordwijk et al. 2011).[2] The world's remaining natural forests can be effectively protected and managed only if stakeholders understand their interactions with the drivers of change —

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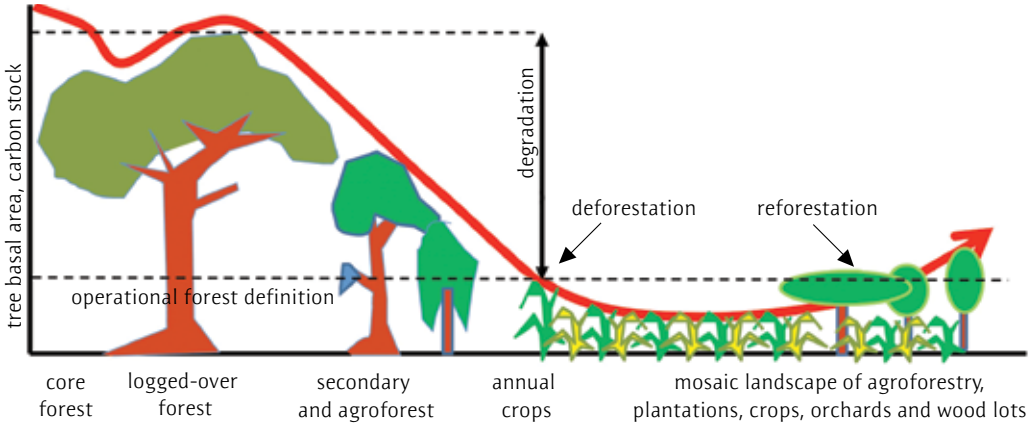
which are primarily agricultural — and the opportunities for trees on farms and in plantations to replace natural forests for the provision of timber and non-timber forest products (van Noordwijk, Agus et al. 2013; Minang and van Noordwijk 2013). In "climate-smart" landscapes the issues of vulnerability, adaptation and mitigation are also important, and synergies between them are sought (Duguma et al. 2014).

Central to the FTA programme has been the forest transition curve (Figure 1), which was formulated two decades ago and has been fundamental to the Alternatives to Slash and Burn (ASB) partnership for the tropical forest margins (Minang, van Noordwijk and Kahurani 2014). The transition curve can be seen as an environmental Kuznetz curve ("things have to get worse before they change for the better"), as a statement about changes in space ("theory of place"), in time or in institutional context ("theory of change"), with some predictive value.

Figure 1. Forest transition curve



Note: Based on multiple hypotheses on temporal, spatial and institutional patterns as well as cross-linkage of relationships at a landscape scale

The transition curve can be interpreted as a testable hypothesis related to spatial and temporal dynamics. It also provides a framework for understanding relationships at the landscape, regional and national scales, where various stages of transition can coexist.[3]

The often-cited von Thünen's (1842) economic geography concept (Figure 2) describes a prevalence of trees close to the village, as firewood was essential and not easily transported over larger distances, followed by open field agriculture, grading into remaining wilderness at a greater distance. This spatial pattern is still recognizable in many parts of the world where home-gardens associate trees with the places where people live. Von Thünen located *Forst Wirtschaft* (production forestry) in the second circle, close to the centre of economic activity, because of its importance as an energy source, and because of transport costs. Natural forest or even remnants of such were already absent from the European landscapes known to von Thünen in 1842.

Figure 2. Spatial organization of productive landscapes around a town

Note: As represented by von Thünen (1842) for a self-sufficient state: a zone of *Freie Wirthschaft* providing vegetable, dairy and other products with short shelf life is surrounded by an (agro) forestry *(Forst Wirthschaft)* zone providing wood fuel and other tree products with high transport costs, before zones of crop rotations *(Fruchtwechsel, Koppel Wirthschaft, Dreifelder)* and animal husbandry *(Vieh Zucht)*.

Given their respective landscape positions, how do various types of land cover with trees interact in terms of income, productivity, food diversity and security, the management of the flows of water and other ecosystem services, the movements of plants and animals, and local influences on climate? Can a better understanding of the processes in a complex landscape mosaic support the emergence of more integrated and adaptive solutions?

This perspective of a landscape interacts with one that starts by recognizing a diversity of actors and stakeholders and their conflicts and opportunities in order to move toward more negotiated, and agreed, actions. It interprets a landscape as a dynamic feedback system. This leads to a focus on the governance mechanisms that link the drivers of change to the consequences at the landscape scale of land-use decisions that affect the provision of various ecosystem services. Conceptually, this is the core of FTA landscape analysis. It is supported by experience in countries and landscapes that are in very different stages of forest transition and development.

Testable hypotheses on tree cover transitions

Pattern

Any evidence of forest transition depends on what is — and what is not — included in the concept of *forest* (see "operational forest definition" in Figure 1). Major qualitative changes in the type of vegetation, from natural forest to planted forest, are rarely evident in commonly used national forest statistics. A more objective parameter, tree cover, has been documented as declining over time (Meyfroidt and Lambin 2011). At a global scale, the percentage of agricultural land with at least 10% tree cover was documented to increase after the year 2000 (Zomer et al. 2014). Indeed, at the national scale, many countries in Europe, North America and more recently Asia report increases rather than decreases in the total coverage of all categories of forest.

The inflection points have historically occurred at almost any human population density and percentage of forest cover (Köthke, Leischner and Elsasser 2013). However, increases in forest area have to date been achieved in association with outsourcing food and fibre production to other areas; on average, 50% of the reported gain in forest area at the national scale may be leaked[4] in terms of an increased external footprint (Meyfroidt et al. 2013). At the sub-national scale leakage can be even greater.

Underlying drivers

A recent analysis of quantitative studies of drivers of deforestation and factors associated with forest protection (Busch and Ferretti-Gallon 2014) summarized evidence that agriculture (proximity to existing agriculture, agricultural prices) has a strong association with deforestation, as do factors associated with development (proximity to roads, proximity to urban areas, rural income support, markets and population density). The factors most strongly associated with reduced (or negative) deforestation are protected area establishment,[5] terrain features such as elevation and slope, the presence of indigenous peoples, poverty and high timber prices.

The association with poverty is a specific concern for all those who hope that development and forest protection can be combined. It is necessary to proactively prevent the association of reduced poverty with increased conversion of forests. Human migration and onflicts as well as post-conflict reconstruction are associated with many of the factors that increase deforestation. They provide the means (i.e., the labour force) and rationale as well as the policy imperative for forest conversion, in a complex interplay of local people (including elites), companies, national and local governments, and planned and spontaneous migrants (Galudra et al. 2013).

Although there is a general expectation that greater gender equity in decision-making would increase conservation, current experimental evidence challenges this hypothesis (Villamor et al. 2013). Among the more promising approaches to reducing deforestation and resource over-use are the enhancement of indigenous and local property rights and local value-addition, in conjunction with the long-term protective effect of higher timber prices, which encourage the domestication of useful forest species (Mpanda et al. 2014). Such domestication can, however, lead to conservation failure if it stimulates migrant flows.

Consequences

Is having more trees always better? The positive and negative consequences of qualitative and quantitative change in the tree cover of landscapes are generally well understood. The restoration of tree cover through agroforestry can be a source of production and food security (Mbow, Neufeldt et al. 2014). There is recent evidence that areas with up to at least 50% tree cover are positively associated with child health through better nutrition and dietary diversity (Ickowitz et al. 2014).

Tree diversity is generally declining on the left side of the forest transition curve, although it is important to distinguish between remnant, spontaneously established and planted trees as contributors to tree diversity (Ordoñez et al. 2014). The consequences of change in tree cover to watershed functions have been much debated. The consensus among hydrologists is that, contrary to popular perceptions, tree planting (especially with fast-growing species) tends to increase water use beyond its positive effect on infiltra-

tion. This reduces dry-season flows unless the soil was strongly degraded and is rapidly recovering (Ghimire et al. 2014). When the probability of recycling of terrestrial evapotranspiration as rainfall elsewhere is included in the assessment, however, the net effects of landscape-scale tree cover protection and enhancement may be positive, depending on location (van Noordwijk et al. 2014).

Response options

Analysis of the consequences of current changes in tree cover needs to be accompanied by negotiation and action from stakeholders to identify appropriate responses. Drivers, not symptoms, need to be addressed in order to achieve lasting impacts. Figure 3 provides a systems perspective, posing six key questions that can jointly help stakeholders understand the dynamics of landscapes and the way in which information about and awareness of the positive and negative consequences of tree cover change can lead to effective feedback that helps drive change.

Figure 3. Six key questions

Who cares? Who is affected by or benefits from the changes in tree cover and associated ecosystem services? How are stakeholders organized and empowered to influence the drivers?

So what? How do ecosystem services (provisioning, regulating, cultural/religious, supporting) depend on tree cover and the spatial organization of the landscape?

Why is land use what it is? What are the drivers of current human activity and what are the levers (regulatory framework, economic incentives, motivation) for modifying future change?

Where are remaining forests and planted trees? Since **when**? How does tree cover vary in the landscape (patterns along a typical cross-section, main gradients), and how has it decreased and increased over time?

Who makes a living here, what is ethnic identity, historical origin, migration history, claims to land-use rights, role in main value chains, and what are the key power relations?

How are forests and trees used? **What** land-use patterns, with or without trees, are prominent in the landscape and provide the basis for local lives and livelihoods? What value chains are based on these land uses?

FTA as a research programme is associated with networks that build on negotiation support rather than decision support (van Noordwijk, Lusiana et al. 2013). There are still high expectations that economic incentives in the form for payments for environmental services (PES) will be part of the overall solution. FTA, through further analysis of multiple PES scenarios (van Noordwijk et al. 2012; Namirembe et al. 2014), explores the

relations and possible synergy of feedback loops between local and external stakeholders of landscapes, and tries to nudge land use in a direction that is desirable or at least acceptable to all.

Conclusions

By considering the landscape as a system — where multiple functions and stakeholders interact with a changing climate — stakeholders can build on a rich experience in dealing with watershed management and biodiversity conservation. Although external stakeholders may be focused on issues such as greenhouse gas emissions, water flows or globally important biodiversity, local priorities may be livelihoods and rights to key resources. These views often clash initially. A combination of social exchanges (respect and recognition in exchange for commitment) and economic incentives (investment and payments in exchange for verifiably improved environmental quality) need to be carried out. Current research efforts that see landscapes as dynamic socio-ecological systems build on a strong foundation in many contributing disciplines. Meeting multiple sustainable development goals simultaneously, however, will be a major challenge that justifies new efforts to link knowledge to action in more effective ways.

Endnotes

1. The FTA is currently implemented by CIFOR, ICRAF, Bioversity, CIAT, CIRAD and CATIE. See www.cgiar.org/our-research/cgiar-research-programs/cgiar-research-program-on-forests-trees-and-agroforestry.
2. See IPCC, 2014. Agriculture, Forestry and Other Land Use (AFOLU); chapter 11 in Working Group III – Mitigation of Climate Change. http://report.mitigation2014.org/drafts/final-draft-postplenary/ipcc_wg3_ar5_final-draft_postplenary_chapter11.pdf.
3. The specific spatial sequence of land cover types without and with trees may vary according to technology, transport costs and institutional history.
4. The term *leakage* refers to the shift of agricultural production and associated deforestation to other locations.
5. According to Dewi et al. 2013, however, this externalizes land pressure.

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Section 2

Global landscape initiatives

Photo credits, Section 2

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2.1 FAO's Forest and Landscape Restoration Mechanism

DOUGLAS MCGUIRE

Every year, around 13 million hectares (ha) of land are deforested (FAO 2010), an area the size of Greece. Although more than half the loss is compensated for by afforestation and natural expansion of forests, a significant amount of forest and other productive land is lost annually.

Continued deforestation and land degradation contribute to poverty, hunger and loss of biodiversity in many parts of the world and make it increasingly difficult for farmers and local communities to adapt to the impacts of climate change and increasing competition for scarce resources. These processes threaten the livelihoods, well-being, food, water and energy security, and the resilience of millions of people. Diminishing land productivity is a key issue as the world struggles to increase food production significantly to feed a global population that is estimated to be more than nine billion people in 2050 (UN-DESA 2013).

The challenge of managing land sustainably is made more difficult by sector-based approaches where policies and practices are developed and implemented in relative isolation from one another. Many national planning processes also follow this approach, often with little or no consultation across sectors.

FOREST AND LANDSCAPE RESTORATION SHIFTS THE EMPHASIS FROM SIMPLY MAXIMIZING TREE COVER TO RE-ESTABLISHING ECOSYSTEM FUNCTIONS AT THE LANDSCAPE SCALE.

The landscape approach is a means to consider a range of land-use systems such as forestry, agriculture and livestock production in a more integrated manner. Forest and landscape restoration (FLR), based on an integrated landscape approach, has evolved as an option to reverse the increase in degraded land. The scale is immense: according to the Global Partnership on Forest and Landscape Restoration (GPFLR), more than two billion ha of the world's deforested and degraded landscapes — an area larger than South America — have potential for restoration. Restoring this land would help reduce poverty, hunger and the negative impacts of climate change, restore ecosystem services and conserve bio-diversity. This would benefit millions of people worldwide.

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Forest and landscape restoration shifts the emphasis from simply maximizing tree cover to re-establishing ecosystem functions at the landscape scale. It seeks a balance between restoring ecosystem services related to habitats and biodiversity, regulating water, carbon storage, etc., and supporting the productive functions of land for agriculture and related uses.

A mosaic approach aims to achieve restoration at a scale large enough to have a significant impact, and to address multiple objectives related to ecosystem protection and improving the productive capacity of land. This approach considers several types of land use over a broad landscape and is the best option for restoring up to three-quarters of the two billion ha of degraded forest land (GPFLR, WRI, South Dakota State University and IUCN 2011). Such an approach, however, adds complexity at several levels; if this complexity is not addressed, it could reduce the likelihood of long-term success.

Recent history of FLR

In recent years awareness has grown of the great potential of FLR, thanks to several international processes and partnerships. The GPFLR, the Landscapes for People, Food and Nature initiative and the International Model Forest Network (IMFN; see article 2.2) are some of the most active global networks — in the case of IMFN, for more than 20 years — that promote sustainable land use across landscapes to meet multiple objectives. These partnerships include many prominent international institutions that do work related to environmental matters and international development. They have contributed to building a critical mass of organizations and governments that are helping to create greater public awareness[1] and are putting FLR on the political agenda in major global processes.

Since 2010, two major initiatives have set targets for restoring degraded land. At the 10th Conference of the Parties to the Convention on Biological Diversity (CBD), held in Japan in October 2010, many of the world's governments adopted the Aichi Biodiversity Targets. One of these (Target 15) calls for countries to restore at least 15% of their degraded ecosystems by 2020. At a ministerial conference in Bonn, Germany in September 2011, the Bonn Challenge was established, which sets a target of restoring at least 150 million ha of degraded land by 2020. To date, several countries and regions have made significant commitments to the Bonn Challenge;[2] a total of 20 million ha have been pledged so far, with another 30 million proposed. Together, these initiatives are mobilizing many governments, international organizations, NGOs and civil society groups to take action to restore degraded lands. Restoration programmes are being planned or are underway in Brazil, Mexico, Rwanda, Ghana and Guatemala. The initiatives are supported by national and local government agencies and by international institutions including the International Union for the Conservation of Nature (IUCN), the World Resources Institute (WRI), Tropenbos International, Wageningen UR and the Food and Agriculture Organization of the United Nations (FAO).

There is still a significant gap between the level of political support and recognition at the international level and action on the ground to achieve these ambitious targets. In order to meet them, significant efforts are required at the country level to more effectively

connect stakeholders and institutions. Many of them lack the means to jointly consider policy, technological and other considerations that require a well-coordinated approach.

The enabling environment and institutional concerns

In some countries, policies and laws related to one type of land use may conflict or be incompatible with those related to other uses. The responsibility for each sector often lies with a different government department or ministry, and mechanisms for cross-sectoral and interdepartmental consultation are often lacking. This can lead to confusion, conflict or other constraints in implementing and enforcing laws, policies and regulations. This is particularly the case when the boundary between different land uses may not be clear (e.g., trees grown on agricultural land); when the same land users are managing across different types of land use; or when different levels of government (national, regional, provincial, etc.) are involved.

Because mosaic landscape restoration involves more than one type of land use, these institutional, legal and policy issues can strongly influence the effectiveness of restoration programmes. A thorough analysis of the legal and policy frameworks, tools and instruments that affect land use and possible restoration activities may be needed, with appropriate measures taken to harmonize existing policies and laws across sectors, or even devise new ones where gaps exist.

Brazil has taken several steps to revise legal instruments to more effectively integrate land-use concerns across sectors. In its efforts to decrease deforestation in Amazonia, the government has followed an integrated approach to land restoration and recognized the importance of maintaining a minimum amount of forest cover, including on agricultural lands. The Brazilian Forest Code (revised in 2012) now requires a minimum level of forest cover (20–80%) on private land and in protected areas. As a result, reforestation and restoration has become an imperative and is now being carried out in many areas (see article 4.10).

Some analysts attribute the significant reduction in deforestation in the Brazilian Amazon over the past ten years to more effective policies across several sectors that have improved monitoring and enforcement, increased protected land and made access to rural credit dependent on compliance with deforestation legislation (CPI 2012). The Action Plan for the Prevention and Control of Deforestation in the Legal Amazon is seen by many as an effective mechanism for increasing coordination and encouraging revisions to sectoral policies. The Brazilian National Plan on Climate Change is another important milestone for the integration and harmonization of public policies related to land use (see article 5.2).

Brazil's example may prove useful for other countries that face the challenges of developing a more comprehensive and coordinated approach to land use. In cases where institutional reform cannot easily be carried out, there may be scope to establish inter-departmental or inter-ministerial bodies (e.g., coordinating committees, task forces, etc.) that facilitate discussion and consultation across various land-use sectors. The continued

emphasis on restoration efforts by global summits, conferences and similar high-level initiatives can help mobilize the strong political support that is needed at the national level to carry out reforms and establish mechanisms for improved coordination.

Economic considerations

Relatively little data is available on the economic costs and benefits of FLR, and what little data does exist is often scattered and has not been subjected to comprehensive analysis. It is widely accepted, however, that restoring degraded land can require a significant investment of money and human resources, especially in highly degraded areas where intensive land preparation and long-term management and protection may be required. FLR can also bring economic benefits. According to IUCN estimates (GPFLR, WRI, South Dakota State University and IUCN 2011), reaching the restoration target of the Bonn Challenge could generate approximately US$ 85 billion annually for national and local economies.

Identifying and mobilizing the financial resources necessary for wide-scale restoration are likely to pose a major challenge. Public funding from national governments for restoration of degraded lands is very limited and unlikely to increase significantly in the near future, unless new compelling arguments are made about the long-term cost effectiveness of sustainable restoration work. A serious effort is required to document cases where restoration is paying off, both in ecosystem services in the long term and in financial returns in the short to medium term. Documenting cases of financial returns generated from FLR work will be important in creating interest in and opportunities for increased private-sector investment.

Financial incentives should be balanced with long-term environmental, socio-economic and culturally appropriate objectives in order for FLR efforts to be fully compatible with sustainable development principles and to address economic, environmental and social concerns in a balanced way. Innovative business models exist (see article 4.6); these can inform and inspire local communities, cooperatives, entrepreneurs, small and medium enterprises and private companies.

FAO and FLR

The Food and Agriculture Organization of the United Nations (FAO) is a specialized agency whose goals include eliminating hunger and poverty and the sustainable management and use of natural resources. FAO has a long history of assisting countries with projects that support sustainable land use. As a member of the GPFLR, and in support of the Bonn Challenge and the Aichi Targets, FAO has established the Forest and Landscape Restoration Mechanism.[3] The mechanism focuses support for and scales up FLR work at the country level. It will facilitate a process in selected countries to provide support for improving the enabling environment, institutional arrangements, organizational and technical capacity and other concerns related to designing, planning and implementing a large-scale and comprehensive FLR programme.

The FLR Mechanism will contribute to meeting the Bonn Challenge and the Aichi Targets at the country level in four ways:

- facilitating a multi-stakeholder process in selected countries,[4] mobilizing key actors from government, civil society, private sector and the international community, to define needs and opportunities for FLR and identify key FLR players. Where deemed appropriate by national authorities the process would lead to a national FLR plan that includes areas for both wide-scale and mosaic restoration, the potential roles and responsibilities of all actors, capacity development needs, financial resources and technical support required and a resource mobilization strategy. The plan would need to take into full consideration ongoing and planned FLR efforts occurring in a variety of sectors (forestry, agriculture, rangeland, etc.) and in the context of different processes[5] and incorporate them to avoid overlap and duplication. Direct support to country processes is planned to begin by early 2015, depending on the availability of resources;
- developing, compiling and disseminating tools and best practices related to FLR, taking into account existing related efforts (e.g., on land-use planning, community participation, genetic resources, biodiversity conservation, protection from pests and disease, fire management, water and soil conservation, landscape values);
- supporting the establishment of pilot projects to demonstrate viable technologies and approaches and help broker new large-scale projects and programmes with national, multilateral and bilateral donors and the private sector; and
- supporting quality control of well-established FLR efforts to ensure compliance with accepted guidelines and standards.

The roles and responsibilities of all participants will need to be agreed to as part of a process of comprehensive discussions. No "blueprint" of how to best organize, coordinate and implement FLR will be promoted; the process within each country will need to be tailored to its specific institutional and biophysical context. Successes and failures will be reviewed and used as the basis for moving the process forward in each country.

The global level

At the global level, the FLR Mechanism will support the development of guidelines and standards for the establishment of baseline situations and the monitoring, measurement, reporting and verification of successful restoration efforts. This will be done in full collaboration with GPFLR and interested countries and will contribute to national and international reporting obligations.

The mechanism will identify and make available to countries and implementing agencies information about sources of funding for FLR, and will inform financial and donor institutions about opportunities for funding FLR. A crucial function will be to ensure that FLR becomes a more integral part of budget allocations of key international financial institutions through closer partnership and collaboration.

It will also contribute to the more effective embedding of and reporting on FLR actions in global and regional commitments and processes, especially those related to multilateral environmental agreements such as the United Nations Convention to Combat Desertification, the CBD and the United Nations Framework Convention on Climate Change.

The regional level

In order to support countries in their efforts to achieve the Aichi Targets related to ecosystem conservation and restoration, the CBD Secretariat has organized a series of regional capacity-building workshops for biodiversity and protected-area specialists from CBD member countries. The workshops provided technical information and allowed participants to share experiences with approaches, technologies, economic considerations and other factors.

FAO has partnered with the CBD Secretariat to support the participation of representatives of other land-use sectors, mainly forestry agencies, in order to broaden the discussion on landscape restoration.

The results are promising. A number of countries now incorporate restoration concerns more fully into planning tools such as national biodiversity strategies and action plans. The workshops are setting the stage for a broader multi-sectoral discussion at the country level that will explore how to move forward with more detailed planning for and implementation of FLR. Discussions are being held about the potential support that could be provided by FAO through its FLR Mechanism, in collaboration with other GPFLR members and related institutions.

Conclusions

The recent increased visibility of and political support to FLR, combined with new efforts to refocus priorities in international organizations and governments, are creating unprecedented opportunities to initiate large-scale programmes. These could have a significant impact on land restoration and the many associated benefits that would follow, in terms of both improved ecosystem services and increased land productivity. Urgent action is now needed at the country level in order to implement FLR. Key to these efforts being successful are approaches that connect — in an effective and ongoing manner — the various sectors and institutions associated with restoration work. A process is needed that addresses the issues in a comprehensive manner and leads to action in a wide variety of areas and on issues as diverse as legal frameworks, technology innovation, participatory approaches and stakeholder involvement and research needs.

The Forest and Landscape Restoration Mechanism builds on FAO's advantages as a United Nations agency with expertise and experience in several of the land-use sectors that are key to FLR and its extensive network of country, sub-regional and regional offices. Working closely with other GPFLR partners and related institutions to support countries in the planning and implementation of FLR work could contribute significantly to meeting or surpassing the targets set by the Bonn Challenge and Aichi Biodiversity Targets.

Endnotes

1. It is significant that the restoration of degraded land was one of the most important issues recognized by the public during the Rio+20 Conference held in 2012 in Rio de Janeiro.
2. They include the U.S., Rwanda, Costa Rica, Ecuador and the Atlantic Forest Restoration Pact, a consortium of local governments, NGOs and land-owners in the Atlantic Forest region of Brazil (see article 4.10).
3. The mechanism was officially launched in June 2014 during the 22nd Session of the FAO Committee on Forestry.
4. The selection of countries will depend on a variety of criteria, including level of political and financial commitment to FLR by government (e.g., where there is an existing pledge to the Bonn Challenge), existence of ongoing or planned programmes, projects or activities that would facilitate or complement FLR Mechanism support, existing means and capacity of supporting institutions, etc.).
5. The main environmental conventions all include planning processes, such as the UNCCD National Action Programme (NAP), the UNFCCC National Adaptation Programme of Action (NAPA) and the CBD National Biodiversity Strategy and Action Plan (NBSAP).

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2.2 Governance solutions from the International Model Forest Network

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Introduction

As the global population continues to increase in coming decades, particularly in the tropics, dependencies on land and natural resources will increase. Landscapes will be expected to provide an increasing number of functions (Sayer et al. 2013).

A landscape is more than a geographic territory. It is a multi-layered mosaic of land cover types and land uses such as farms, forests, water, mining and inhabited areas where multiple stakeholders and their social networks — with their own values and strategies — overlap and interact with each other and the environment (van Oosten 2013). There is increasing international agreement that the landscape approach is the most effective method of incorporating conservation and human development dimensions into land-use planning and the broader sustainable development agenda (Global Landscape Forum 2013). The approach enhances an understanding of environmental impacts and assists stakeholders in making informed decisions in a transparent, adaptive and resilient manner.

Good governance is the basis of a landscape approach that makes substantive changes to ecosystems and people.

For more than 20 years, the International Model Forest Network (IMFN) has been implementing participatory, landscape-level approaches to the sustainable management of natural resources. IMFN is a voluntary global community of practice comprised of more than 60 Model Forests that cover 100 million hectares (ha) in 30 countries (Figure 1) and continues to expand.

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Figure 1. International Model Forest Network map

Note: Data as of August 2014

Model Forests are defined by a large-scale landscape approach and a voluntary and broad-based governance structure that represents a wide range of interests. These include forests, agricultural land, conservation areas, mining concessions, recreation areas and communities. Individuals, groups and institutions can all have a voice through the Model Forest partnership. All Model Forests are bound by a common set of principles, and each is also unique by virtue of its local context. The governance structure of a Model Forest is guided by accountability, transparency and consensus; it reflects local social, cultural, environmental and economic values.

The reasons for forming a Model Forest differ from place to place; various organizations, groups or individuals can take the lead. Model Forest partnerships are usually created to address a significant issue or challenge; for example, leaders have come to the realization that existing practices and relationships are inadequate. The Model Forest approach offers a set of guiding principles that can aid stakeholders in addressing and overcoming these issues.

The four case studies (see also article 4.1) highlighted below illustrate how Model Forests offer a valuable approach to sustainable landscape management through multi-stakeholder governance, knowledge generation and exchange, and the ability to address challenges at multiple scales.

Kodagu Model Forest, India

Sacred grove conservation through cooperation

Kodagu Model Forest, established in 2003, encompasses the entire Kodagu District in Karnataka State. It is part of the Western Ghats region, which has been identified as one of the eight "hottest hotspots" of biodiversity in the world (Myers et al. 2000). Kodagu has more than 1,200 sacred groves scattered across its 4,108-km^2 area. Sacred groves are forest fragments with religious significance to local people who worship nature and ancestors.

Sacred groves are owned by the Forest Department and protected under the *Indian Forest Act*. Because of their religious significance, sacred groves are managed by local communities as a form of common property. Although they are generally less than two ha in size, their religious importance has helped safeguard a high level of biodiversity.

In recent years significant population increases have resulted in an increased demand for agricultural land and timber. This has led to the degradation of community lands and sacred groves. The Model Forest partners recognized that sacred groves cannot be considered in isolation from one another or from the broader landscape. A key activity has been the restoration of sacred groves through multi-stakeholder activities involving government agencies, forest communities, coffee growers and others.

By cooperating and pooling their resources, stakeholders have been able to raise awareness about sacred groves and increase community engagement in their management and conservation. For example, research on sacred groves (Bhagwat and Kushalappa n.d.) and the surrounding landscapes conducted by the College of Forestry of the University of Agricultural Sciences in Bangalore led to improved management planning. An NGO, the Centre for Environmental Education, held numerous public outreach sessions, many targeted towards youth. The critical support provided by the Forest Department and the strong involvement of local communities ensured the project's success.

Because of the Model Forest multi-stakeholder approach there has been a change in the communities' perception of the ownership, management and importance of sacred groves. They now see sacred groves as centres of bio-cultural diversity. The initiative has also influenced higher-level policy development through its inclusion in the National Biodiversity Strategy and Action Plan and in the Karnataka State Biodiversity Strategy and Action Plan (Kushalappa and Raghavendra 2012). In another strong indication of success the state government recently provided funds in the annual budget for restoration activities for groves throughout the entire state. This is the first initiative of its kind in India.

Tierras Adjuntas Model Forest, Puerto Rico

From local initiative to national public policy

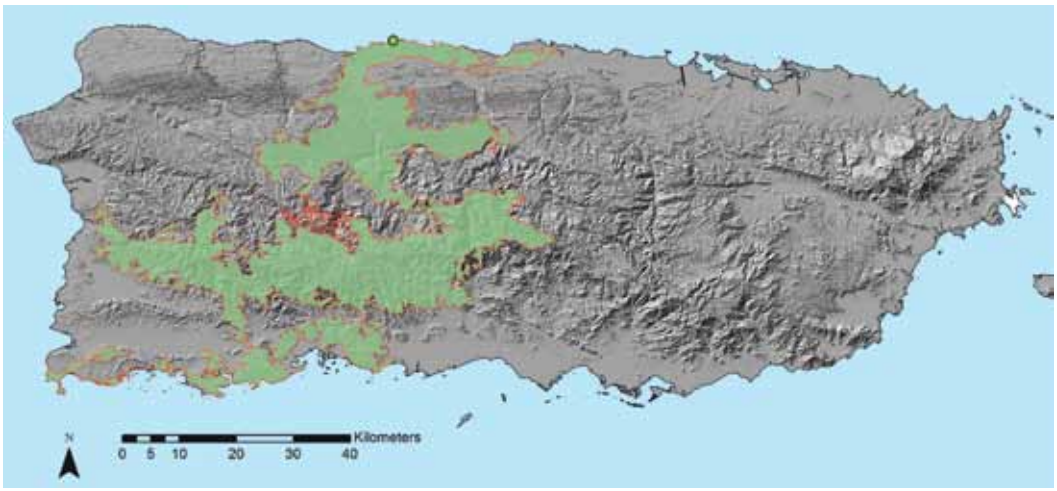
A resurgence of community initiatives in the conservation of forest areas in Puerto Rico led the government to approve legislation in 1999 that connected several state forests in an attempt to create an ecological corridor. However, the legislation failed to identify a

mechanism for integrating the landscape into a broader management strategy. In 2004, an expanded plan was adopted. It established conservation measures for riparian zones and forest stands that defined a biological corridor for wildlife and other natural resources. Despite these actions, balancing environmental, social and economic values at the landscape level remained challenging. There was growing recognition that community-based conservation initiatives were necessary to address these challenges.

In 2006, the Tierras Adjuntas Model Forest was established. It was a partnership that involved key land users and managers and other stakeholders in the geographic area, including the national government. This began a process of developing a landscape-level management approach anchored in a governance model that is representative, participatory, transparent and accountable, and promotes collaboration among stakeholders. The Model Forest identified the social, economic and environmental values of the communities within the landscape. By clearly acknowledging the importance of collaborative partnerships and participatory governance to address landscape-scale management challenges, the Model Forest provided a mechanism for integrating a wide variety of stakeholder interests and values.

Since 2006, the Tierras Adjuntas Model Forest has advanced a landscape approach based on integrating the strengthening of communities and the conservation of natural resources. This work led to a scaling up of the Model Forest approach, from the site level (14,368 ha) to a proposed national Model Forest (153,285 ha; Figure 2).

Figure 2. Proposed national Model Forest, Puerto Rico



In July 2014, legislation was passed promoting a more integrated, effective and efficient way to use public resources to address conservation and the promotion of sustainable development in an area that encompasses approximately one third of the island.[1] The *Ley del Bosque Modelo de Puerto Rico* (Model Forest Law of Puerto Rico) recognizes the need for a voluntary and permanent multi-sectoral entity with representation from government,

academia, communities, non-governmental organizations and private companies. The entity will consider and enact strategic plans to harmonize new and existing economic activities with natural resource conservation, and promote greater quality of life within communities.

The Model Forest approach has shifted national policy in a significant way. The new law is a powerful mechanism to implement a suite of public policies and a platform for integrating environmental, economic, social and cultural development at the landscape level.

Campo Ma'an and Dja et Mpomo Model Forests, Cameroon

Building resilient communities for climate change adaptation

Changes in climate and extreme weather events disrupt food production systems. In countries such as Cameroon, many smallholders use unsustainable farming techniques and rely on forest products for subsistence. These factors, along with increased pressures on lands and forests, create significant challenges to food security and livelihoods.

Starting in 2013, the African Model Forest Network (AMFN) and Cuso International[2] implemented a project to help local farmers adapt to these challenges. The Eco-Agricultural Business for the Adaptation to Changes in Climate (B-ADAPT) project addresses several landscape issues through the promotion of new eco-agricultural planting techniques (which associate nitrogen-fixing species with bio-fertilizers and crop rotation) and the development of value chains focused on African plants and non-timber forest products (NTFPs).

The project supports 234 farm schools in more than 226 villages in Cameroon's two Model Forests: Campo Ma'an and Dja et Mpomo. More than 2,000 agricultural, NTFP and non-conventional livestock producers are involved.[3] The farm schools increased community capacities in participatory monitoring and evaluation, conflict management and business development; 60% of the schools are led by women and indigenous people, who serve as community peer educators.

The schools are learning spaces where local farmers test and share knowledge with other farmers, work together to obtain micro financing, reinforce value chains and gain better access to markets. This allows farmers to increase productivity and supports a network of smallholder businesses that can be sustained and scaled up throughout the value chains.

The Model Forests facilitated links with the Ministry of Agriculture and with industry, local officials and banks to strengthen services to producers and increase collaboration among stakeholders. The Model Forest governance structure, which reaches hundreds of communities, along with its accumulated history of outreach experiences contributed to the quick and extensive mobilization of this project. The B-ADAPT project has the potential to contribute to building more sustainable and resilient landscapes.

Vilhelmina Model Forest, Sweden

Reindeer herders, GIS and land-use planning

Although this fourth case study is located far from the tropics, its lessons are valuable to many ecosystems around the world where wildlife, traditional livelihoods, and competing tenure arrangements call for new approaches. The Vilhelmina Model Forest encompasses a portion of three of the 51 official reindeer-herding districts of the indigenous Sami people. Reindeer husbandry is one of the last remaining large-ungulate migratory systems: semi-domesticated reindeer move across vast areas every year — sometimes 300 km or more — from the mountains to the coast of the Gulf of Bothnia and back. The reindeer herders have guaranteed access to land for grazing, regardless of ownership and other ongoing forestry land use, on 55% of the northern part of Sweden (about 22.6 million ha). Overlapping land-use regimes have led to conflicts, which are exacerbated by a lack of equity, openness and information.

Each herding district produces a management plan that includes information about reindeer habitat use and movement. Through the Model Forest, the Swedish Forest Agency, researchers and herders increased the plans' efficiency through a participatory GIS (pGIS) tool. It integrates input from indigenous communities and builds local capacity in spatial data mapping and database development. The reindeer herders — who equipped the reindeer with GPS collars — and the forest companies use the pGIS database. Herders were also trained in satellite image interpretation and field inventory techniques. By merging traditional and scientific knowledge, the system allowed herders and industry to better assess reindeer movement and habitat use, and identify potential areas of conflict.

The pGIS tool led to more collaborative decision-making. This improved information sharing between herders and forest managers through a more open and transparent planning process. It has also led to consultations with other land-use stakeholders in the mining, energy and tourism sectors. The planning process developed through the Model Forest has now spread to all 51 reindeer herding districts in Sweden.

Lessons learned

There are many examples of effective, broad-based and resilient partnerships found in Model Forests around the world. Good governance is the basis of successful landscape approaches; six key governance factors have been identified from more than 20 years of Model Forest experience.

Effective landscape solutions need broad partnerships and collaborative governance

Broad stakeholder engagement facilitates a common understanding of the vision, values and needs of the landscape. An effective governance structure for landscape management must provide stakeholders with a neutral, non-threatening and constructive forum through which they can explore issues at multiple scales and negotiate creative solutions.

In addition, IMFN stakeholders have found that by pooling their limited resources and focusing their efforts on a longer-term common vision, they achieve what they could not

do on their own. Whether individuals and organizations contribute by providing cash, office space, staff time or knowledge, joint efforts will create new opportunities. Nesting local networks within larger ones creates a community that leverages more resources and knowledge, and from which emerges a network that has power and influence to truly improve sustainable landscape management and the livelihoods of communities (Weathley and Frieze 2006).

Good governance requires responsible resource managers

For effective landscape management, it is necessary to ensure that the people and organizations who have strong interests in the issues and challenges facing the area are involved and willing to listen to each other. This can sometimes be a challenge. In addition, formal and informal connections are needed with appropriate government departments and agencies to ensure that local activities are linked to regional and national policies. Effective landscape-level implementation must involve those with land and resource management authority, such as governments, industry and communities.

Voluntary engagement creates stronger governance

An effective landscape approach should not affect land ownership or administration but rather set in place an operational environment in which choices and trade-offs are discussed by the stakeholders affected by land-use decisions. In such a system, resource managers are not obliged to change their management practices, but their engagement often leads to their better understanding of other stakeholders' concerns and ideas and increased willingness to implement innovations. The voluntary nature of the process creates a dynamic, flexible and surprisingly solid governance environment that leads to long-lasting change. Several Model Forests have experienced challenges in obtaining and maintaining voluntary engagement from stakeholders.

Building capacity leads to enhanced engagement and empowerment

At the core of a Model Forest is a diverse group of stakeholders with various levels of capacity for engaging in landscape management processes. It is important to enhance their understanding of resource management and support their engagement in decision-making. They need to know how national and international policies affect them. Stakeholders also need access to information to build capacity in specific issues, such as REDD+ or climate-smart agriculture.

Managing competing interests and values

Landscapes comprise conflicting values and uses. It is important to create tools and processes — ranging from codes of conduct for new stakeholders to participatory mapping — to manage competing interests. Although an open, transparent, voluntary and participatory process such as a Model Forest is often a giant first step in dissipating potential conflict and orienting stakeholders towards creating a common solution, having appropriate tools and processes in place can facilitate conflict resolution.

A landscape approach is a process, not a project

Creating constructive dialogue and building trust and transparency among stakeholders, takes time, often several years. For the landscape approach, long-term engagement is needed, while short-term wins help keep stakeholders engaged. A key challenge is to secure funding for activities both for the short and long term. The landscape approach should be considered a flexible process of learning and engagement, adapting as new knowledge and issues arise and with no fixed start or end dates.

Conclusion

The Model Forest concept has been applied in a wide array of ecological, social, economic, cultural and political contexts in both developed and developing countries. The concept has shown itself to be flexible and adaptive to its setting (Besseau, Dansou and Johnson 2002). It is not an easy process to implement successfully, but perseverance and utilization of lessons learned can lead to effective and sustainable change.

The Model Forest concept links high-level policy objectives of sustainable landscape management to local-level processes and tools that are anchored in inclusive, locally based governance mechanisms. This creates a framework for landscape management that is comprehensive in its approach, scalable in its operation and effective in the breadth and depth of the activities undertaken. This can help local stakeholders address a wide range of challenges and allow them take advantage of emerging opportunities such as REDD+, forest landscape restoration, climate change adaptation, improving food security and creation of a green economy.

Acknowledgements

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For more information

For more information about the IMFN, please visit www.imfn.net.

Endnotes

1. The senate approved the act on June 24, 2014.
2. The African Model Forest Network is one of five regional networks of the IMFN. Cuso International is a Canadian-based international development organization that works to reduce poverty and inequality through the efforts of skilled volunteers.
3. The farm schools built on earlier AMFN experience in the development of its Practical Itinerant School programme.

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2.3 Community-based approaches to landscape management

DIANA SALVEMINI and NICK REMPLE

Introduction

Despite significant progress in expanding protected areas (PAs), biodiversity is being lost across the world at an unparalleled pace. In fact, much if not most biodiversity remains outside PA systems. The fate of this biodiversity — and of the vital ecological processes that cannot be sustained within PAs alone — will depend on the sound management of socio-ecological landscapes. Practitioners, donors and governments are increasingly interested in supporting work at the landscape level to protect global environmental values related to climate, biodiversity, and land degradation, as well as development priorities, including food security, disaster risk reduction and poverty alleviation.

Although there is growing support for community-based activities, these often occur outside a strategic framework and lack integrated outcomes that produce ecological and social resilience to climate change and other pressures. Many community-based efforts ignore the fundamental principles of stakeholder participation in the identification, design and execution of initiatives, which weakens their sustainability. Too few approaches deliberately target local organizations as active partners, rather than more passive beneficiaries, and fail to build local capacities though a learning-by-doing approach; i.e., designing, undertaking, evaluating and revising their own initiatives through adaptive management. Fewer still are those initiatives and approaches supported by donors over the longer term that slowly but surely build the social capital to sustain the adaptive management process to achieve social, economic and ecological resilience.

THE ENORMOUS DIVERSITY OF LANDSCAPES REQUIRES LOCALLY ADAPTED SOLUTIONS TO MEET THE NEEDS OF STAKEHOLDERS AND THE ECOSYSTEM FUNCTIONS ON WHICH THEY DEPEND.

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The COMDEKS project

Over the past several years, the United Nations Development Programme (UNDP) has been integrating and adapting a new community-based landscape management approach through the Community Development and Knowledge Management for the Satoyama Initiative (COMDEKS) project.[1] Its approach is based on lessons learned from more than two decades of experience with community-level projects and activities.[2] The COMDEKS Project was launched in 2011 as the flagship of the Satoyama Initiative, a global effort to promote the sustainable use and management of natural resources in socio-ecological production landscapes and seascapes (SEPLs). In Japanese, *satoyama* refers to landscapes incorporating villages and the surrounding mountains, grasslands and woodlands, and describes a concept of people in harmony with nature.

The COMDEKS project covers a wide variety of landscapes in 20 countries around the world, supporting innovations identified by communities for biodiversity conservation, promotion of ecosystem services, agro-ecosystem management and strengthening of governance systems at the landscape level. The project is implemented in inland water systems such as lakes (Kyrgyzstan, Malawi and Niger), watersheds (Cambodia, Ecuador and Costa Rica) and wetlands (Slovakia); in coastal seascapes (Fiji, El Salvador, Indonesia and Turkey); in mountain ecosystems/landscapes (Bhutan, Ghana, India and Nepal); in agro-pastoral systems (Ethiopia, Cameroon and Brazil), and in grasslands (Mongolia and Namibia).

The project works through the Small Grants Programme (SGP) of UNDP's Global Environment Facility, providing small grants directly to local community organizations. COMDEKS has been designed to support local community activities to maintain and, where necessary, rebuild SEPLs, while also collecting knowledge from on-the-ground actions for dissemination to other smallholder organizations and adaptation to other landscapes and regions of the world.[3]

Through a process of social learning, projects are organized and implemented as part of a landscape strategy. In each country, grants are provided through SGP Country Programmes and their National Steering Committees, which are decentralized, voluntary, multi-stakeholder decision-making bodies. This is a fast, flexible and proven mechanism to reach communities and civil society at the local level in a country-driven manner.

The landscape management approach piloted through COMDEKS focuses on strengthening or renewing SEPLs. These are mosaics of uses and intensities of use that permit the conservation of biodiversity, sustain the generation of ecosystem services and enhance livelihoods and incomes, especially for the most vulnerable people. The evolving approach relies on a participatory planning process that strengthens local organizational capacities and ownership. It also depends on the networks of organizations and relationships across sectors that are fundamental to

resilience and sustainable development. The aim of this approach is to empower communities by engaging them to enhance and sustain the ecological, economic and social resilience of the landscapes and communities where they live and work.

Community organizations — cooperatives, self-help groups, advocacy groups and others — will pursue sustainable management of the landscape and its processes and resources if the benefits of doing so enhance the social and economic well-being of the people who live there. To maintain interest, innovation and commitment, community organizations must own the process of landscape planning and management. This ownership is built by community organizations acting as primary decision-makers, and determining the socio-economic and ecological objectives of landscape management, the innovations to be pursued, the modes of execution, the indicators of success, and the lessons learned. Above all, by reflecting on the decisions they have made in carrying out their own initiatives, community organizations build their capacities to adapt their practices to ecological, economic and social challenges and opportunities. As owners of landscape planning and management, they are active partners, not passive beneficiaries. They take the lead in determining how to meet the demands of enhancing resilience by strengthening ecological sustainability, economic growth and social cohesion.

In this community-based approach, landscapes are initially selected based on a wide variety of criteria, the most important of which is the demonstrated interest and engagement of the communities themselves. A participatory baseline assessment is carried out to identify problems in the landscape and discover their causes. Using mapping exercises, problem tree analysis[4] and focus-group discussions, community members and stakeholders identify the characteristics, resources, challenges and opportunities of their landscapes.

As part of this process, a set of indicators for resilience in socio-ecological production landscape and seascapes (SEPL indicators; Bergamini et al. 2013) is applied.[5] The indicators are a set of 20 questions designed to capture the interrelated dimensions of key landscape-level systems: ecosystem resilience, social resilience and economic resilience. They are a tool to help communities reach a common understanding of threats and solutions, and define resilience-strengthening strategies (Box 1).

Through knowledge-sharing and relationship-building at the community level, the use of the indicators, combined with landscape mapping exercises (Box 2), creates an opportunity for landscape stakeholders to share valuable information on relevant issues in the area, highlighting assets, problems, threats and opportunities. Although the indicators guide the discussion, the maps created by the communities are reference material for future analysis and planning, providing important insight into the area's specific socio-ecological characteristics.

Box 1. Piloting resilience indicators in the Datça-Bozburun peninsula, Turkey

The target landscape for the COMDEKS project in Turkey is the Datça-Bozburun peninsula, located in Muğla province in the southwest of the country. The peninsula is a Key Biodiversity Area,[7] representing one of the world's most pristine Mediterranean lowland forest and coastal ecosystems. The target landscape spans 247,700 hectares (ha) and includes Datça and Bozburun peninsulas and the rich marine habitats of Gökova Bay. Stakeholder-driven participatory planning processes and the practical application of the SEPL indicators, integrating community-based perspectives, were effective in reaching a common understanding of threats and potential solutions and defining resilience-strengthening strategies.

During the use of the indicators, it was essential to tailor the training content to meet the needs of participants. Interactive mapping exercises and the use of photos of the landscape proved to be particularly successful in providing a spatial dimension to conservation priorities and encouraging relevant and practical solutions. One challenge was to adapt the terminology to community needs. The language used in the first version of the indicators was found to be too complex for most of the audience to easily comprehend. In response, facilitators simplified the language and provided examples relevant to local communities to ensure that all members understood the terms and concepts. Community mapping was effective in engaging participants in discussions, and the social and cultural indicators provided participants with various perspectives from which to assess their landscape.

The Country Programme Landscape Strategy

During community consultation and participatory planning exercises, participants select desirable resilience outcomes for landscape management in four areas:

- ecosystem services and biodiversity;
- sustainable production systems;
- income generation; and
- strengthening of formal and non-formal institutional and governance systems at the landscape level.

These outcomes form the framework for the COMDEKS Country Programme Landscape Strategy. This comprehensive document is developed in each participating country through a community consultation process that delineates the landscape issues and the strategic approaches for community-based actions to achieve the chosen outcomes. These approaches guide the community selection of specific initiatives for direct grant funding. A fundamental premise of the UNDP approach is that community organizations select the concrete problems to be addressed as well as the responses that will be tested for potential adoption.

The enormous diversity of landscapes requires locally adapted solutions to meet the needs of stakeholders and the ecosystem functions on which they depend. The knowledge of local stakeholders has been developed through years of observation and experience with the management of natural resources and ecological processes. When this knowledge is combined with more systematic and scientific approaches, community organizations can identify innovations, test them and obtain replicable results. Based on an analysis of pilot initiatives, these innovations may be adapted for further experimentation by community organizations. Reflection on progress toward landscape-level outcomes allows community members to adjust activities and approaches as needed and use this information to inform new planning and action. Techniques and technologies that enhance resilience are developed and/or adapted locally by the organizations themselves; learning reliable systems of innovation is key to the process of community empowerment. The lessons learned are disseminated to all other stakeholders in the organization and across the network of organizations in the landscape and to policy-makers. Innovation, adaptation and the dissemination of the lessons learned and other knowledge gained is the essence of social learning and the basis of social capital and resilience.

Box 2. Village mapping in India for collaboration and community empowerment

As part of the consultation process, the COMDEKS project in India engaged community members in an analysis of the landscape and a village mapping exercise. The target landscape for COMDEKS activities in India is an area of approximately 50,000 ha located in the Kumaon Region, located in Uttarakhand, a mountainous state in the north of the country. This is an area where the interdependence of humans and nature is particularly pronounced.

A baseline assessment of the landscape was carried out in November 2012 through a stakeholder consultation workshop; additional field visits ensured community participation. An important part of the community consultation was a mapping exercise in each of the participating villages to list and locate the critical local natural resources and identify who had access to them. Input from village consultations and workshops informed the design of the COMDEKS strategy for India and subsequent grant-making. The main areas of concern emerging from the baseline assessment included the loss of productive land due to forest fires, soil erosion and threats from wild animals; soil and water degradation from industrialization; and a shortage of labour due to migration. Poor market linkages and lack of awareness of best management practices have also contributed to a loss of biodiversity and the economic hardships that residents face. Although time consuming, the mapping exercise provided an opportunity to involve a large number of men and women from the community, including those who have traditionally been marginalized. This built trust and strengthened relationships between facilitators and community members, and established a structure for shared decision-making and responsibilities.

Lessons learned

Some initial lessons learned and recommendations have emerged from implementing the COMDEKS approach.

Participatory landscape planning is a prerequisite for collective action and the development of social capital. In COMDEKS landscapes, the community consultation process enables the development of participatory strategies that are negotiated by representatives from local communities. This process builds ownership and community capacity to work together for common goals, and guarantees a high degree of sustainability due to the knowledge and social capital generated. The use of the resilience indicators has proven particularly effective in providing a structure to discussions, allowing communities to better understand what resilience means in a specific landscape, and how it should be assessed. In India, for example, the village mapping exercise, combined with the use of the indicators, contributed to community collaboration and empowerment, creating knowledge sharing and trust building.

Landscape strategies address inter-related challenges at the landscape level and propose integrated economic, ecological and social solutions. When looking for ways to address global challenges — including poverty eradication, food security, climate change and environmental sustainability — concerted, holistic actions at the local level are critical. Sectoral approaches are not sufficient. In each target landscape supported by COMDEKS, communities agree on long-term outcomes for multifunctional landscape management, including maintenance and enhancement of ecosystem services and biodiversity, more sustainable production systems and greater food security, sustainable livelihoods and increased household income, and stronger landscape governance. COMDEKS landscape strategies detail the changes and improvements communities wish to see. They also set out the plans that communities have for achieving their goals through local initiatives that they design, implement and evaluate, adapting as necessary to new conditions.

Effective governance of production landscapes calls for formal or informal institutions that can represent multiple stakeholders with an integrated landscape plan. In Ghana, for example, one important governance innovation has been the establishment of the Weto Platform, a consortium of civil society groups and traditional authorities who have agreed to work together to achieve integrated landscape governance. Successful governance of integrated landscapes does not necessarily require the establishment of formal state institutions at the landscape level; mechanisms that create connections and communities of interest across the landscape may be more effective.

Knowledge sharing and dissemination of lessons learned is critical to scale up successful interventions at the landscape level and beyond. Knowledge generation and dissemination are essential for building the adaptive management capacities of community organizations and for strengthening social learning through community organizations and landscape-level and sub-regional networks. Generating knowledge requires an accessible methodological approach to innovation, analysis of the experience and dissemination of lessons learned and good practices. This knowledge is based on locally specific evidence that can be transmitted from person to person and group to group across the landscape, and used to propose credible policy and programme reforms.

Working at the landscape level requires long-term engagement and adaptive management. Working at the landscape level and using a process of adaptive management entails long-term strategic engagement with communities, and a programme-based rather than a project-based approach. It must focus on participatory community-based learning by doing, and create an opportunity for multiple donors to collaborate in funding innovative and more strategic activities over a reasonably long period of time.

Endnotes

1. With a contribution of US$10 million from the Japan Biodiversity Fund, established within the CBD Secretariat, the COMDEKS Project is implemented by UNDP in partnership with the Ministry of the Environment of Japan (MOEJ), the Secretariat of the Convention on Biological Diversity (SCBD), and the United Nations University-Institute of Advanced Studies of Sustainability (UNU-IAS). See www.comdeksproject.com.
2. These include the GEF Small Grants Programme (SGP), the Community-Based Adaptation Programme and the Community Management of Protected Areas for Conservation (COMPACT) initiative.
3. Through support to community-based biodiversity management — ecosystems, species, plant genetic resources — and sustainable livelihood activities, the COMDEKS project contributes to achieving the objectives of the Convention on Biological Diversity and the implementation of the Aichi Biodiversity Targets adopted by the tenth meeting of the UN Convention on Biological Diversity Conference of the Parties (October 2010).
4. A problem tree analysis is a participatory method of determining all the known causes and effects of a specific problem.
6. See Bergamini et al. 2013. Since 2013, UNDP (through COMDEKS) has worked with Biodiversity International, the Institute of Global Environmental Studies (IGES), and UNU-IAS on a collaborative effort, under the International Partnership for the Satoyama Initiative (IPSI), to revise the indicators and develop a toolkit for the application of the Indicators of Resilience. The indicators toolkit is expected to be launched during the Fifth IPSI Global Conference (IPSI-5) and CBD COP 12 in October 2014.

7. Key biodiversity areas are identified nationally using simple, standard criteria, based on their importance in maintaining species populations.

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Section 3

The landscape approach: from theory to practice

Photo credits, Section 3

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3.1 Financing emissions reductions in Oromia, Ethiopia

ANDRÉ RODRIGUES DE AQUINO
and ROBERT J. GRIFFIN

Climate change policy and landscape-level interventions

As the global population continues to rise, increasing demands for food and fuel are depleting the world's natural capital: the stock of natural resources that provides the goods and services necessary for human survival. In developing countries, where food and energy security are already areas of concern, domestic policy-makers and the international community realize that there is a need for policy solutions that increase food production while preserving natural capital.

This challenge has drawn attention to an integrated landscape approach to sustainable development. Such an approach involves cross-sectoral management of natural capital to increase the effectiveness of sustainable sourcing and production. It seeks to simultaneously meet policy-maker's goals for food production, ecosystem health and human well-being.

There is no single model for landscape-level approaches.

There are several institutional, policy and financing challenges to achieving an integrated landscape approach; these make it a difficult option for policy makers to implement. This article uses a case study from Ethiopia to show how integrated landscape management can be achieved by linking with programnes that reduce emissions from deforestation and forest degradation (REDD+).

Institutional, policy and financing challenges

Lack of institutional capacity at the national and sub-national level is one of the key barriers to landscape-level management. Most governments — not just those in the developing world — fail to coordinate their efforts in a coherent manner, due to a lack of incentives to work in a cross-sectoral way and to agencies' alignment to a specific sector or type of land use. International institutions also contribute to fragmentation; a multitude of conventions, organizations and initiatives relate to land management, but most have a single-issue mandate.

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Financing related to land management is similarly fragmented. At the national and local levels, incentives are created through policies and fiscal measures (e.g., agricultural subsidies, concessional loans by development banks, etc.), which often are linked to specific sectors.

Recently, financing for climate mitigation (through donor funds and markets for carbon offsets or GHG emissions reductions) has come to be seen as a way to create incentives to change land management practices. Several developing countries such as Indonesia, Costa Rica and Ghana, expect that an international mechanism to incentivize REDD+ (reducing emissions from deforestation and forest degradation) would provide a significant source of finance by creating value from the carbon stored in forests.

Case study: Ethiopia

In Ethiopia, agriculture — and therefore, economic growth and food security — rely on sustainable land management (SLM). Land degradation is a major cause of the country's low and declining agricultural productivity, persistent food insecurity and rural poverty. Studies have shown that by the mid-1980s, some 27 million hectares (ha), or almost 50 percent of the Ethiopian highlands (which in turn makes up about 45% of the country's land area) were significantly eroded (Desta et al. 2000). Of this eroded area, 14 million ha were seriously eroded, and more than 2 million ha were beyond reclamation. It is estimated that some 30,000 ha are lost annually as a result of soil erosion; more than 1.5 billion tonnes of soil are removed annually by a range of land degradation processes (World Bank 2013).

Sector-specific interventions have failed to address land degradation. National and regional authorities in Ethiopia, along with their development and technical partners, are now promoting more integrated interventions to landscape management. The multi-year (2009–23) Ethiopia Strategic Investment Framework for Sustainable Land Management (ESIF) recognizes that past efforts by various agencies have failed due to their lack of coordination. The ESIF is a platform for multi-sectoral partnerships in which various stakeholders align their investments in a collaborative manner (see also article 3.6). This has led to promising results, such as the rehabilitation of degraded landscapes into productive ones in the northern region of Tigray.

The Oromia Forested Landscapes programme

As part of Ethiopia's ongoing national REDD+ readiness process, the goal of which is to allow the country to comply with international requirements to receive payments from international sources for verified reduced emissions from deforestation and forest degradation, the Government of Ethiopia (GoE) selected Oromia regional state as the site for testing a large-scale REDD+ programme. The plan is to reduce deforestation and forest degradation and increase forest cover. Oromia was identified as a priority since it harbors over 60% of the existing dense forests of Ethiopia (a total of around two million ha) and the majority of the country's woodlands. In addition, Oromia had created a dedicated semi-private institution, the Oromia Forest and Wildlife Enterprise (OFWE), to manage its forest estate.

Deforestation and forest degradation in Oromia is driven primarily by agriculture conversion (both large-scale commercial and small-scale subsistence farming), fuelwood extraction and charcoal making, and livestock. The most important commercial crop is coffee, and land is still being cleared for the expansion of full-sun coffee plantations. Clearing of land for subsistence agriculture is the result of the low productivity of existing agricultural practices and an increasing demand for food. Most of the region's energy is supplied by biomass, and unsustainable rates of fuelwood collection threaten local forests, particularly woodlands. Natural regeneration in degraded areas is hindered by their use as grazing lands.

The underlying causes of deforestation and forest degradation in the state are the same as those in the country in general. They include poor enforcement of land-use laws and regulations, unclear land tenure, lack of incentives and support for sustainable forest management at the local level, and demographic trends and economic policies that favour commercial crops and livestock (Government of Ethiopia 2010).

Programme structure

The programme will be led by the Oromia President's office, through a dedicated REDD+ Coordinating Unit that is responsible for the overall strategic vision and for ensuring coordination across the relevant sectors (particularly agriculture, forestry and energy). An Oromia REDD+ Steering Committee was established, with members from key regional-level institutions. They have responsibilities for land use in the region (from government and civil society), provide strategic guidance to the programme and oversee its activities.

The national REDD+ Secretariat at the federal Ministry of Environment and Forests (MEF) oversees the programme to ensure that it aligns with the emerging REDD+ framework at the national level. OFWE will implement activities in forest areas (both dense forests and woodlands); the Bureau of Agriculture (BoA) will be in charge of activities on croplands and grazing lands. At the local *(woreda)* level, activities will be coordinated by a Bureau of Agriculture. In order to provide technical assistance to local land users, the Coordinating Unit may call on executing agencies such as NGOs and private-sector entities.

The programme aims to promote cross-sectoral investments in the sectors of forests, agriculture, livestock and biomass energy to address deforestation and forest degradation. In agriculture, the programme will promote climate-smart agriculture practices to decrease the demand for cropland. In the forest sector, participatory forest management (PFM) will be scaled up and intensified in both dense forest areas and woodlands. PFM has been promoted in Ethiopia since the mid-1990s (Gobeze et al. 2009), as a strategy to sustainably manage forest resources by giving local communities rights and responsibilities for the management of forest tracts.

Energy needs would be addressed from the demand and supply side. On the demand side, the programme would promote more efficient cooking stoves and alternative energy sources, such as biogas and briquettes. On the supply side, the programme would establish timber plantations for a range of uses, including fuelwood and charcoal-making. The programme would also improve the existing regulatory framework, particularly for land tenure and land-use planning.

These interventions would be promoted across Oromia. The areas to be targeted for investments are being identified by the regional government through spatial analysis of historical deforestation and multi-stakeholder consultations.

The Oromia REDD+ Pilot programme

The Oromia REDD+ Pilot programme has three characteristics:

- it works within a jurisdiction (Oromia regional state);
- it takes a landscape approach to its interventions — the planning unit is the landscape (existing forest blocks), and investments cut across sectors (agriculture, forestry and energy); and
- it is financed through a results-based financing model.

These traits are expected to increase the effectiveness of the programme; that is, to enhance the likelihood of achieving emissions reductions from avoided deforestation.

Increasingly, a jurisdiction-wide approach to the implementation of REDD+ is preferred (VCS 2014), as it delivers the benefits of REDD+ on a greater scale, with uniform implementation arrangements over a large area. A jurisdiction can make the policy decisions needed to change the incentives that affect REDD+, such as the clarification of land tenure rights, the adoption of rules for sharing benefits from REDD, creating an enabling environment for the private sector, and the adoption and enforcement of participatory land-use planning. In addition, establishing the programme at the level of a jurisdiction enhances the likelihood that high-level decision-makers will be directly involved in its implementation, which fosters cross-sectoral coordination. This creates an enabling environment. In Ethiopia, for example, land certificates can be issued only by national and regional authorities. Only the government can enforce a master land-use plan.

The programme takes a landscape approach. The planning units are the existing forest blocks, since the main goal of the programme is to reduce the loss of existing forests. That means that the high-priority areas for investment are those at risk of deforestation, and that local interventions are planned to reduce the pressure on existing forests. Increasing agriculture productivity is a key goal; the programme seeks to ensure that the growing population has access to food and fuelwood without further encroaching on existing forest blocks. The connections between forests and energy are also highly relevant; the establishment of fast-growing timber plantations and more efficient energy technologies can reduce the pressure on existing forests (Graham 2011).

A key challenge of the landscape approach is ensuring cross-sectoral coordination. Various entities are responsible for the components of the landscape, including agriculture bureaus, forest agencies and energy bureaus. The Oromia REDD+ programme will address this issue through its Coordinating Unit, which can arbitrate among various land uses, such as commercial agriculture development and forest conservation. The agencies in charge of forest and agriculture lands are well represented in the unit and have clear implementation responsibilities. This is expected to reduce conflicts over responsibilities and institutional boundaries. The budget to be managed by each entity, and the funding, will also be clarified prior to the start of the interventions to prevent conflicts. At the local level, land-use decisions will be made by local watershed management committees (representing various types of land users), which have already been established as part of the national government's efforts to promote sustainable land management.

The programme will be financed through results-based funding from donors. In the implementation phase, disbursements will occur once benchmark results are achieved. Since the financing is earmarked for specific expenses, this gives the programme more flexibility in the use of the resources and places the focus on results rather than inputs. Results-based financing is a tool that donors can leverage to incentivize a wider range of results during implementation that would otherwise not be possible without the provision of a guaranteed financial reward. Results indicators will include area under SLM practices, number of communities managing forests according to an agreed management plan and number of land certificates distributed to land-holders. Results will be verified independently by an entity to be selected. The funds will be channelled to the actors who implement the activities, including government agencies, community associations and land-holders. After the programme has been set up and implemented according to donor requirements, payments from verified reductions in emissions from deforestation and forest degradation (or from increase in carbon stock in land and forests) would be used to ensure the sustainability of the new land-use practices adopted by local communities.

Conclusions

Landscape-level approaches can be an important tool to meet the dual objectives of natural resource management and sustainable economic development, particularly given the strong linkages between activities that drive land degradation, including forestry, agriculture and bioenergy. Such approaches require institutional arrangements to foster decision-making at multiple levels of governance (national, regional and local) and involving a large number of stakeholders (crop growers, herders, forest associations, etc.). National regulatory frameworks can provide incentives to a range of stakeholders. Landscape approaches require top-down policy reforms coordinated with bottom-up incentives to change behaviour. Policies should enable communities to benefit from sustained land-based ecosystem services, while creating conditions for the private sector to invest in sustainable activities, in energy, forestry and agriculture — the sectors that drive land use change.

Results-based climate financing such as REDD+ offers an innovative opportunity for landscape-level interventions. By focusing on one clear and quantifiable goal (i.e., emission reductions), programme managers can address the linkages between multiple activities that affect land use. Results-based financing is expected to create incentives at the national and regional level to support a regulatory framework that will help the programme to succeed. In the Oromia case, this will include policies that clarify land tenure and promotion of macro- and micro-level land-use planning (and enforcement of plans). At the local level, payments tied to changed land-use practices have the potential to promote sustainable land management.

There is no single model for landscape-level approaches. Jurisdictions such as Oromia should develop an approach that suits their particular circumstances. Emissions reductions are only one benefit of this type of programme. Local benefits, such as increased agriculture productivity, will determine whether new land-use technologies are adopted by local land-holders.

The programme is in the early stages, and implementation has not yet begun. A robust process of generating knowledge from this experience is needed, in order to inform Ethiopia's regulatory framework for land use and the international debate around landscape management.

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3.2 Empowering local stakeholders for planning, Indonesia

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Landscape approaches towards sustainability of ecosystem services

Beginning in the mid-2000s the ecosystem service (ES) framework developed by the Millennium Ecosystem Assessment — and a performance-based incentive mechanism for climate-change mitigation through REDD+ — gained immediate and widespread acceptance. Payment for Environmental Services (PES) or, more generally, Rewards for Ecosystem Services (RES) is becoming increasingly popular in Asia (van Noordwijk and Leimona 2010). They complement rule-based initiatives (for example, land tenure systems and land-use planning) and economic instruments (for example, taxes and subsidies) in achieving conservation and development objectives.

Most PES and RES programmes, however, lack robust monitoring and evaluation systems; performance is not assessed and their effectiveness remains largely unknown. In terms of encouraging governments to reduce emissions from land uses, policy instruments in trade such as uninterrupted export of commodities can be as effective as or more effective than PES (van Noordwijk et al. 2013).

Effective land-use planning can support multiple environmental services.

The main concepts of the landscape approach have been evolving from those of Integrated Natural Resource Management (INRM) since the mid-1990s (Sayer and Campbell 2001), with the promise of managing trade-offs between development and conservation where ecosystem services are at stake. In contrast to a sectoral approach that addresses issues of forest loss in isolation from other issues in the landscape, a landscape approach treats landscapes holistically, allows for inter-dependent issues and finds ways to address policy factors. Landscape approaches should adopt four best practices:

- embrace the principles of INRM to maintain or restore ecosystems and deliver services and benefits through conservation, development and land-use planning processes;

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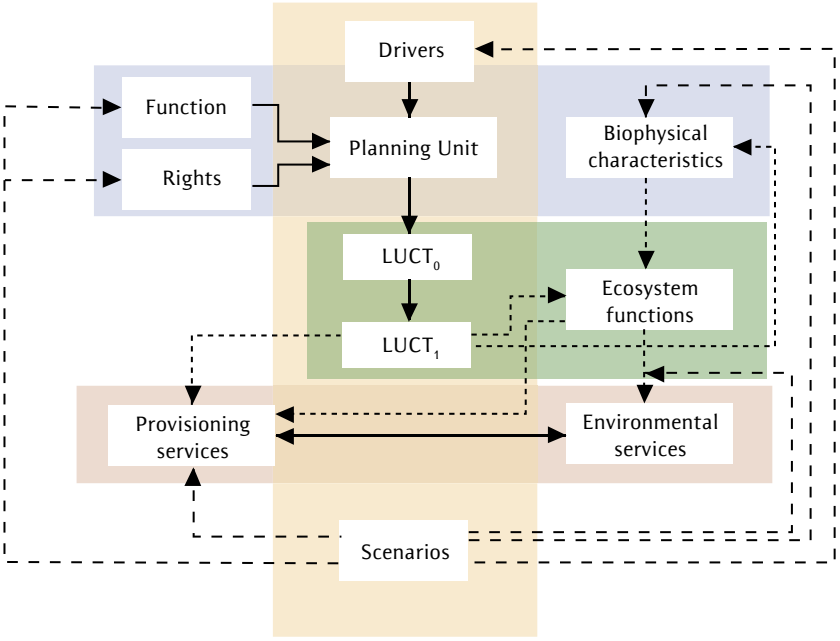
- adopt multiple instruments, using both incentives and disincentives;
- respect local rights and apply social safeguards (see article 5.6); and
- carry out performance-based monitoring to evaluate the effectiveness of the instruments.

There is a lack of technical capacity on the part of local planners in tropical landscapes. A new tool, Land-Use Planning for Multiple Environmental Services (LUMENS; Figure 1), is based on the Land-Use Planning for Low Emissions Development Strategies (LUWES) tool (Dewi et al. 2011), but encompasses issues other than carbon. LUMENS can be used to achieve three goals:

- enable local planners to diagnose historical land-use changes and their impact on ecosystem functions;
- simulate baseline scenarios to encourage interventions with positive consequences and avoid those with negative consequences; and
- analyze the trade-offs between economic benefits and ecosystem functions in various scenarios.

Figure 1. LUMENS: process and components



Note: LUCT = Land Use Change Trajectory

Land-use change in Merangin District, Jambi Province

Merangin is one of Jambi's 11 districts. Its 7,680 km^2 make up 15% of the province and were home to just over 336,000 people in 2010. The district's population density of 45 per km^2 is lower than that of Jambi and Indonesia.

The upper watershed of Merangin is located in Kerinci Seblat National Park, the largest in Sumatra, which forms a substantial forest remnant in the Barisan Range. It is home to a rich array of endemic species. About 71% of Merangin is delineated as forest land. The rest is non-forest land, owned privately or managed by communities or estate companies.

In 2011, the World Agroforestry Centre established a working group in Merangin that included various stakeholders in land-use planning: the District Planning and Development Agency, Forestry Office, researchers and NGOs. The group developed land-use plans that took into account carbon storage, biodiversity and watershed functions. They also delineated Planning Units (PUs) that combined land allocations, permits issued by local and national governments, land suitability and land-use plans.

Forests, including those in the national park, had degraded due to encroachment. During the 1990s and early 2000s, many logged-over forests were converted to rubber and oil-palm plantations. Forest conversion was still taking place in 2005, but changes were more rapid within non-forest areas. Annual emissions attributable to land-use changes in Merangin slowed from 11.6 tCO2e/ha during 1990–2000 to 9.05 tCO2e/ha annually in recent years. The integration of biologically diverse, undisturbed forest with the rest of the landscape has also declined, showing higher fragmentation and higher intensity of land uses between undisturbed forest patches. Edge contrasts between land patches are barriers to ecological processes such as seed dispersal and animal movement, causing forests to become isolated islands, rather than integrated patches, within the landscape (Dewi et al. 2013).

Several scenarios of land uses and changes, based on historical dynamics, illustrate LUMENS:

- Business as usual (BAU): historical changes in each PU are retained, assuming a stationary process and drivers between the periods 2005–10 and 2010–15;
- Expansive agricultural development (Expand): increased conversion of forests to oil-palm and acacia plantations and agroforests;
- Green development (Green): all undisturbed and most logged-over forests are retained and degraded areas in protected forests are rehabilitated. Oil-palm, acacia and rubber plantations and agroforests are established only on shrubland, grassland and cleared land.

Spatially explicit projections of each scenario were created up to 2025 to estimate future economic benefits and ESs. The scenarios were evaluated in terms of profitability, expressed as the net present value per ha of a land-use system. It is a proxy for economic benefits or provisioning ESs provided by land-use change. BAU showed an annual average 3.1% growth and Expand a 6.9% growth in profitability; Green showed a 0.2% decline.

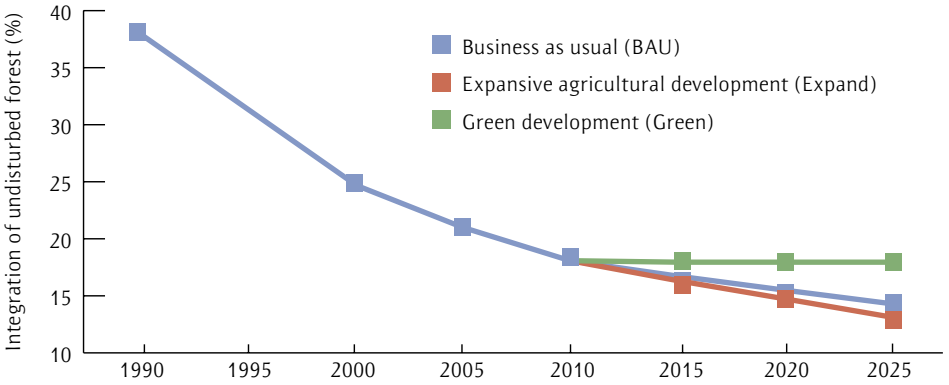
The annual rate of job growth from agriculture and forestry under BAU was 1.99% on average; those of Expand and Green were 2.41% and 0.42%, respectively. The average annual population growth of Jambi during 2000–10 was 2.88%; well above labour growth rate in the most expansive scenario. To address this, post-harvest processing in the

agricultural and forestry sectors would need to be enhanced. For example, oil-palm processors could be established, rather than transporting fruit out of the district. Given the scarcity of land suitable for agriculture, and the amount of land allocated for forests, employment in other sectors would need to be created, along with more devolution of forest management. RES, REDD+ and other compensation schemes are also options.

Opportunity costs (the economic benefit generated from land-use changes that result in CO_2 emissions) are relatively high. For the BAU, only 7.6% of emissions from land-use changes were associated with economic benefits of less than US$ 5. The Expand scenario increased emissions by 6%, while Green reduced 23% of emissions of BAU. Considering the difference in profitability between the BAU and Green scenarios, the opportunity cost of implementing the Green scenario amounted to US$ 26.1 per tCO2e, which is high at today's carbon prices. This means that relying on full compensation from external sources would be neither feasible nor sustainable. Co-investment by both internal and external sources would be necessary to maintain ecosystem services.

In addition to carbon, biodiversity and watershed functions are also important to local stakeholders. Figures 2 and 3 show that landscape-level biodiversity declines sharply and carbon emissions continue to rise under the BAU and Expand scenarios, but remain stable under Green.

Figure 2. Changes in landscape-level biodiversity, 1990–2025

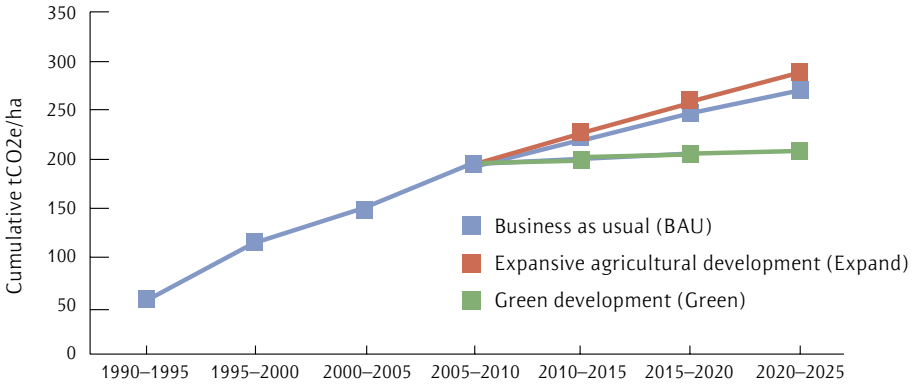


Lessons learned from practical application of the model

The working-group process revealed that a dedicated session is needed in which members explore the basic concepts of LUMENS. Games, examples and illustrations using cases relevant to local issues were effective.

A major problem was the lack of availability and accessibility of data. Often, data are scattered across many offices in different formats and of varying sources and quality. Including members of the group from various government and non-governmental offices would make it easier to compile data. Database management is a crucially important part of the process.

Figure 3. Cumulative land-based emissions, 1990–2025



Leadership of the District Planning and Development Agency is also crucial. Individual leaders can usually be identified during the first round of training sessions, group discussions and key informant interviews. However, the high staff turnover rate within government offices can be a challenge. If possible, it is better to have at least two leaders from each office. LUMENS is simple enough to be managed independently by trained local planners.

Impacts on decision-making

The working group process resulted in a technical document that will inform the district's development plan, emissions reduction plan, annual budget and monitoring and evaluation plan. The latter has become feasible since the scenarios created under LUMENS allow specific measures to be targeted to specific problems. The district was invited to submit a proposal for a REDD+ pilot funded through the Forest Carbon Partnership Facility. Recognition by the national and provincial governments is encouraging replication. Recently, all 11 districts in Jambi gathered to undergo the same process as Merangin. The working group members became trainers of this larger group and also presented at a national forum.

The landscape approach applied in Merangin has integrated the planning process for the entire land-based sector, addressing each planning unit in conjunction with the others. Drivers of changes to forests can be influenced through policy in other (non-forest) parts of the landscape. The development objectives of the district, together with conservation and other programme objectives, can now be achieved by planning for the entire landscape. Each PU is associated with specific land managers and locations within the landscape. Each intervention — and the details of its social, environmental and economic impacts — is known and the impacts are linked to the section of government that is responsible for them.

Previously, in the annual budget process led by the District Planning and Development Agency, it was often difficult for the Forestry Office to receive funding for its programmes. Its targets were often unclear and the locations were not sufficiently

specific; this meant that monitoring and evaluation could not be effectively designed. Using the landscape approach, these programmes can now be mainstreamed.

Those PUs that are under the jurisdiction of the national government but interact with local drivers of change are also addressed in the landscape approach. For example, encroachment on the national park, which is under the Ministry of Forestry, needs to be addressed by joint management, as does permit issuance. In Merangin and other parts of Jambi, mining and forestry concessions — which are issued permits by the national government — often create tension. The working group was able to discuss policy options to reduce this tension, such as a partnership between local government and companies to support local people's involvement in co-managing concessions and/or protecting areas of high conservation value. Under such partnerships, the national government can assist through policies for land use (for example, land swaps) or economics (such as tax reduction). The related Village Forest programme of the Ministry of Forestry allows communities to manage their forests under national regulations. Village Forest has been identified as one PU; demonstrating performance against BAU will contribute to achieving national policies.

Over the next year and a half, the working group will expand its process to include hydrological functions, collecting data and conducting training. With regional economic data now available, trade-off analyses can be comprehensively carried out. This will be followed by three tasks:

- institutionalizing the process fully into medium- and long-term plans;
- harmonizing various funding mechanisms, such as national and local government budgets, REDD+, supported Nationally Appropriate Mitigation Actions, the private sector and carbon markets; and
- integrating with RES.

The future of LUMENS

An early version of the LUMENS software was used as part of the working group's training. It will continue to be refined to include a more efficient algorithm for modelling land-use change and developing a more user-friendly graphic interface. Adding indicators that are relevant to users' objectives in analyzing trade-offs; for example, food security, will be a priority. The World Agroforestry Centre and its partners have facilitated similar processes in 12 other districts of four provinces in Indonesia to broaden application and increase impact.

The centre has joined the Tropical Flagship Initiative, a joint programme of the International Institute for Applied System Analysis and the Indonesian National Committee for Applied Systems Analysis, to apply the Global Biosphere Management Model (GLOBIOM) in Jambi and East Kalimantan provinces. This is an economic model of

land-use decision-making that has been applied widely in numerous other tropical countries. The model seeks to optimize land-use decisions in response to global and external demands for land-based products, based on local land capabilities, labour and local demand. LUMENS and GLOBIOM will be coupled and modified for the Indonesian context. This will allow global economic and policy scenarios to be simulated in local land-use decisions and the consequences for ecosystem services.

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3.3 A landscape approach to climate-smart agriculture in Ghana

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Introduction

Deforestation in the tropics is a significant cause of global climate change (Murdiyarso, Hergoualc'h and Verchot 2010). Where land conversion is fuelled by commodity agriculture, it is imperative to engage farmers in climate-smart agriculture (CSA) practices that include the conservation of forests. For smallholder cocoa producers in Ghana, increasing on-farm carbon storage and reducing greenhouse gas (GHG) emissions must also be linked to enhancing productivity. This increases the resilience of production systems in the face of a changing climate.

The Rainforest Alliance introduced CSA at a landscape scale in the Juabeso-Bia District of western Ghana. The aim was to improve the capacities of farmers to mitigate and adapt to climate change while simultaneously increasing productivity. The project focused on organizing individual farmers, establishing landscape management structures, diminishing pressures to further encroach on surrounding forestlands, and restoring ecosystems within cocoa agroforests and other degraded land-use systems while increasing cocoa production.

The landscape approach also establishes a business case for private-sector investment to generate significant co-benefits.

The landscape

Historically, deforestation in Ghana's Western Region has been driven by cocoa production. Ghana is the second largest producer in the world (Gockowski and Sonwa 2011) and more than half of the country's production comes from the Western Region. The consequences are significant: forest cover in Ghana decreased from 7.5 million hectares (ha) in 1990 to around 5 million ha in 2010 (FAO 2010). In Juabeso-Bia, only 8% of total land cover remains open or closed canopy forest (Figure 1).

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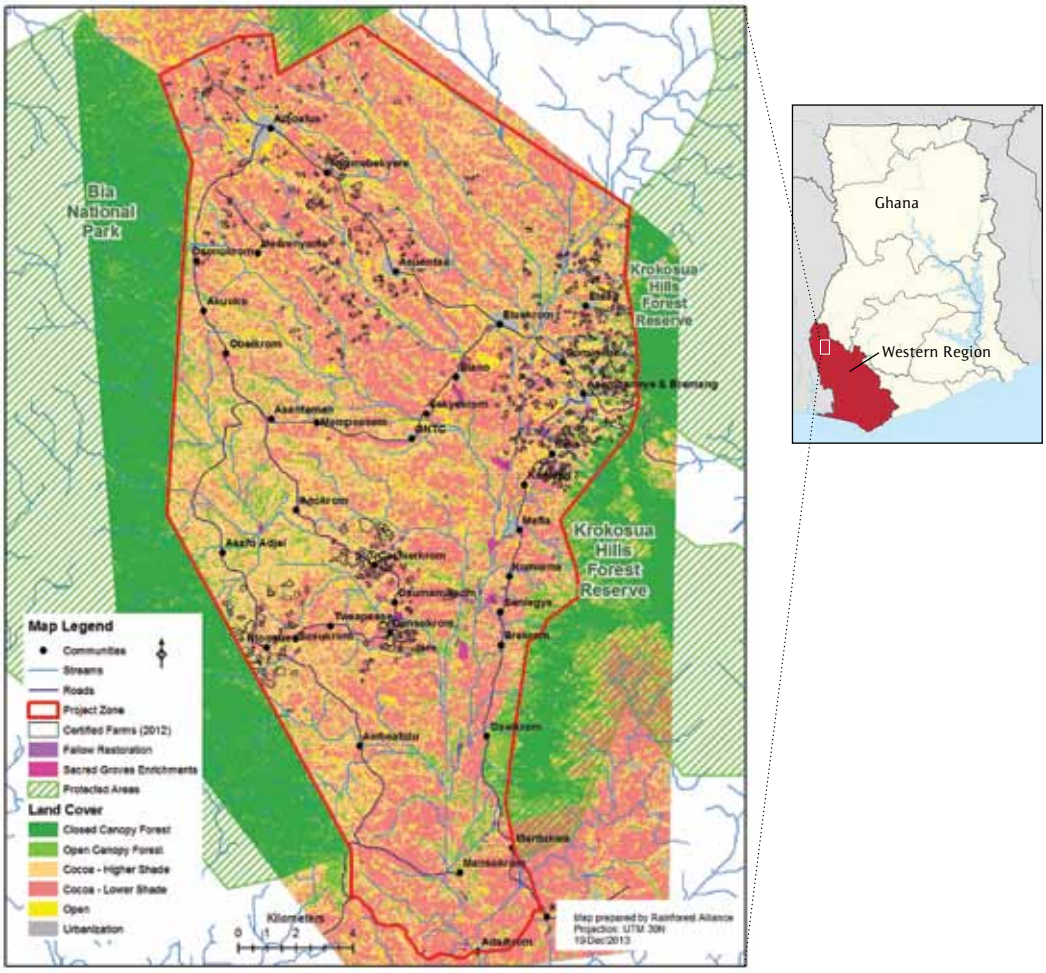
Figure 1. The Juabeso-Bia landscape, including certified farms and land cover classes



The 36,000-ha landscape is made up of a mosaic of cocoa agroforest with various degrees of shade cover, croplands and remnant forest. It is situated between Bia National Park (a Globally Significant Biodiversity Area) and the Krokosua Hills Forest Reserve in the high forest zone of Ghana (Figure 1). The project landscape is a corridor for many species, although both the park and reserve are threatened by cocoa expansion, and by illegal logging in the reserve and poaching in the national park (Fumey-Nassah and Adum 2013). Mining and oil palm production also pose a threat to the park and the reserve, but at a much smaller scale than cocoa expansion (Modern Ghana 2011; Ghanaweb 2010).

The challenges

Under today's business-as-usual scenario, extensive low-input agriculture production is commonplace; cocoa in the Juabeso-Bia area often produces low yields (Dormon et al. 2004; Gockowski and Sonwa 2011). From 1988 to 2010, cocoa cultivation in Ghana

expanded by almost one million ha, much of that occurring in the Western Region, including the Juabeso-Bia District (Gockowski et al. 2010). At the same time, per-hectare production of cocoa has decreased because of poor management practices and the increasing age of the cocoa trees, which, like most perennials, need to be renovated periodically (Dormon et al. 2004).

Landscape composition has been severely affected by land-use change: from tropical forest with closed canopies to cocoa production systems, which are less structurally and floristically diverse (Rainforest Alliance 2013). Rainforest Alliance identified a need for increased community involvement in governing forest resources. This would demonstrate that forests are not obstacles, but rather opportunities to create a diversified economy based on sustainable farm and forest management. Local and regional land-use planning was perceived to be weak, with little involvement from traditional chiefs and cocoa farmers in framing a long-term vision of Ghana's cocoa farming lands. In addition, structured discussions and planning between the Forestry Commission (FC), which manages a large number of forest reserves across this cocoa landscape, COCOBOD (Ghana Cocoa Board) and other cocoa-sector entities had not taken place. Other issues needed to be addressed through a multi-stakeholder process: farmers' lack of legal ownership of trees growing on their land; inequitable benefit sharing; and low compensation to farmers for damages caused to crops through timber harvesting.

Climate change also poses a significant risk to the landscape. Climate change predictions for the region and for the country as a whole indicate that the climate for growing cocoa is subject to change, with conditions in some parts of the cocoa belt expected to decline (Läderach et al. 2013). Cocoa trees are susceptible to changes in the seasonal distribution and total volume of rainfall (Anim-Kwapong and Frimpong 2008). Pests, diseases and the likelihood of forest fires could also increase. The resulting strain on cocoa production might further encourage cocoa expansion to offset the shortfall in yield and quality, or a shift to other forms of agriculture.

A landscape approach

Rainforest Alliance developed a landscape-level project centred on sustainable practices that conserve biodiversity, increase productivity, provide greater long-term stability to all value chain participants and increase the income of smallholder farmers. The goal was to create a sustainable landscape that harnessed the transformative power of markets. Olam International, a leading food company, made commitments to source climate-smart cocoa; connecting to the company's supply network and consumer base helped engage thousands of farmers.

The project, which started in 2010, emphasized improvements in cocoa agroforestry production systems through certification and broader engagement of supply chain

stakeholders. Technical assistance was provided to assist farmers in meeting the rigorous standards of the Sustainable Agriculture Network, or SAN (SAN 2010). SAN encourages farmers to analyze and consequently alleviate environmental and social risks caused by agricultural activities. Many of the SAN criteria necessary for certification already promote CSA practices and can further be enhanced through the voluntary Climate Module of the SAN Standard (SAN 2011), the requirements of which were also met by participating farmers.

Landscape activities implemented under the project were directly linked to Ghana's national agricultural and environmental policy for cocoa production and biodiversity conservation (Gockowski et al. 2010; Government of Ghana 2012). The project was designed as an agribusiness model, the results of which fed into the national Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategy. It also aligned with COCOBOD's goal of achieving one million tonnes of cocoa production without degrading biodiversity or the natural environment (ODI 2007). The project was developed in collaboration with the Wildlife Division of the Ministry of Lands and Natural Resources. The division's policy for collaborative community-based wildlife management aims to support the devolution of management authority to defined user communities and encourage the participation of other stakeholders (Government of Ghana 2012).

Pursuing private-sector collaboration to ensure a market-driven approach was a top priority for the project. In addition to donor support from the United States Agency for International Development and the Norwegian Agency for Development Cooperation, Olam International provided funds to Rainforest Alliance for technical assistance aimed at achieving SAN certification for cocoa as the basis of a REDD+ project. Olam agreed to pay premium prices for the certified cocoa and more importantly offered predictable market access. This builds reliability in the supply chain, which could help support climate finance.

Results

The project has laid the foundation for a landscape approach that focuses on improving livelihoods through an integrated set of activities. These include sustainable land management (including agroforestry, enrichment planting, climate education, REDD+ documentation and timber production on farms) and local enterprise development such as beekeeping and small livestock rearing. The activities have increased economic opportunities for marginalized farmers through an integrated approach to sustainable agriculture and forest management, which in turn has led to significant emissions reductions.

Training and capacity building in climate-smart agroforestry

To date, approximately 2,000 farmers from 34 communities have been trained. This has resulted in more than 6,000 ha of land achieving SAN certification and Climate Module

verification. Through a "train the trainers" approach, 68 lead farmers served as extension agents to facilitate farmer field schools. As part of the SAN standard requirements, forest area was restored through the provision of native tree seedlings, leading to increased on-farm carbon stocks. The project has also helped farmers organize into 12 cooperatives, which improved the coordination of activities such as enrichment planting, farmer field schools and overall training delivery.

Improved economic opportunities

The project developed additional livelihood enterprises around beekeeping and rearing of the greater cane rat (grasscutter, or *Thryonomys swinderianus)*. Beekeeping income is expected to provide alternative revenue, particularly during the lean times between seasonal cocoa harvests. Similarly, grasscutter raising is a promising source of additional revenue in the local market for meat. An important offshoot of the development of these two enterprises was the involvement of local small-scale carpenters. The project provided training to five local carpenters in the construction of beehives and grasscutter cages, resulting in a steady carpentry business during the term of the project.

Increased carbon stocks through restoration

The project also improved the protection of remnant natural forests ("sacred groves") in the landscape and restored forests on nearly 300 ha of abandoned fallow lands. This is estimated to contribute 140,000 tonnes CO2e of sequestered carbon over 20 years. Tree species were selected based on recommendations from the Forest Services Division (FSD) of Ghana's Forestry Commission (FC) and in participatory stakeholder workshops. The Rainforest Alliance facilitated the establishment of two nurseries, where 300,000 seedlings were raised. The project is further assisting communities and individuals in obtaining ownership rights over newly planted trees by registering them with the district FSD officer.

Improved governance

At the start of the project, the Rainforest Alliance identified several potential project risks, including insufficient internal organizational capacity on the part of communities, lack of clarity on the tree ownership rights of smallholders, and marginalization of key stakeholders. The project addressed many of these organizational and administrative capacity issues through the development of cooperatives and a local authority for land management, the Landscape Management Board, or LMB (Box 1).

This governance model has been structured to ensure that the LMB is involved in each step of the project cycle: planning, approving, implementing and monitoring activities. This is expected to guide the development of REDD+ activities after the close of the project and improve coordination with other stakeholders, including the FC, District Assemblies, traditional authorities and the private sector.

Box 1. The Landscape Management Board

The Landscape Management Board (LMB) was set up to build community governance capacities at the landscape and community level and organize farmers in the Juabeso-Bia landscape. The LMB oversees and co-manages the implementation of the project, resolves disputes, and develops and oversees rules and regulations related to natural resource management. The LMB also focuses on increasing wider participation in the project and extending benefits to more communities and farmers.

The LMB executive committee consists of 14 members drawn from the community and represents community interests. As part of the project and the establishment of the LMB, committee members have been trained in climate change education; they lead the climate education campaign in their respective communities.

REDD readiness

In preparation for piloting REDD+ in the Juabeso-Bia landscape, the project focused on capacity building at the community and landscape scale. Rainforest Alliance climate education modules were adapted for use in Ghana to educate students and teachers on climate change, forests and related environmental issues. The project also developed training materials and disseminated information on REDD+ through more than 20 training sessions for LMB members, nearly 100 community forums, and training for more than 2,000 community members, 12 science teachers and 15 schools, with a combined student population of 4,000.

As a result of these training and capacity-building activities, an estimated 80% of residents in the 34 communities have greater awareness of REDD+ issues, processes and forest carbon standards. In addition, teachers implemented Rainforest Alliance's climate change curriculum within their classrooms and formed "Save the Environment" clubs with students.

Carbon project development

The project was designed to demonstrate net positive climate benefits at the landscape scale in line with the Climate, Community and Biodiversity Standards, or CCBS (CCBA 2008). The project undertook a range of studies – on land-use in Juabeso-Bia, on-farm and landscape-level biomass and carbon stock estimation, socio-economic and biodiversity assessments – to prepare a Project Design Document (PDD). The PDD includes investments in agroforestry and in ecosystem restoration, fallow enrichment and sacred grove protection. It also serves as a landscape management planning tool, complete with baselines and monitoring protocols that can be used to negotiate additional financing through the sale of certified cocoa. The governance bodies that are established, strengthened and trained by the project during project

execution are the owners of the document. It should be noted, however, that verification against the CCBS or a carbon crediting standard such as the VCS or Gold Standard has not been carried out to date; therefore, the project has not yet generated or transacted carbon credits or offsets.

Lessons learned

Cocoa farming and timber harvesting are a crucial part of Ghana's national economy and form the basis of the livelihoods of millions of smallholder farmers. Yet these practices continue to drive deforestation, land degradation and climate change, all of which threaten livelihoods. With the demand for cocoa and timber on the rise, a landscape approach is necessary in order to secure the future of Ghana's forests, significantly improve livelihoods opportunities for farmers and forest users, encourage agroforestry, and secure long-term resource security for the private sector. It will also establish a results-based multi-actor governance model through which the government, the private sector, civil society, and local communities can collaborate. The landscape approach also establishes a business case for private-sector investment to generate significant co-benefits. Interventions implemented by Rainforest Alliance have assisted in increasing farm productivity, and in adapting production systems to be more sustainable and to respond favourably and lastingly to REDD+ opportunities. A major component in the success of this approach was the integration of a diverse range of strategies to support livelihood opportunities and long-term resource security among landscape stakeholders.

To achieve a truly self-governing and multi-actor collaboration at the landscape level, a range of efforts to address further coordination and innovation among the various stakeholders is required:

- agricultural intensification, improved cocoa agronomy and sustainable forestry practices;
- improved landscape governance through strengthening the LMB, empowering producer groups and integrating them in cocoa sector governance;
- the development of long-term visions and plans;
- continued monitoring and validation of farm and community development activities, using approved standards to measure financial flows and production of goods and services that support business development;
- expanded landscape restoration and increased establishment of native tree cover and biodiversity corridors;
- more resilient livelihoods and improved food security, including diversification through on-farm timber and non-timber resources and small livestock, potentially complemented by PES systems linked to services provided by sustainable cocoa farms (REDD+); and
- increased supply of and demand for climate-smart, zero-deforestation-certified sustainable cocoa.

This approach demonstrates the opportunities for successful landscape management through engaging with actors along a supply chain and fostering the participation of other stakeholders in the process. Application of the SAN Standard lays a solid foundation on which to replicate a similar approach in other landscapes.

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3.4 Sustainable rural landscape management in Central Mexico

LUCÍA MADRID and PAULINA DESCHAMPS

Introduction

As a result of multiple historical, ecological, political and social processes, around half of Mexico is held in collective ownership by *ejidos* and *comunidades*. These legally recognized forms of collective land ownership are made up of former landless labourers and indigenous groups (Madrid et al. 2009). Since the 1980s, *ejidos* and *comunidades* have gained the right to manage their own forests, creating the possibility of using them to trigger local development (Merino 2004).

In Mexico's rural areas, 11 million people reside in extreme poverty, particularly in forested areas (CNF 2014). This is due to a series of economic and legal obstacles to the sustainable management of natural resources, and to a national economic model that fails to include rural development. Forested regions have been under increasing social and environmental pressures as a result of the demand for land and resources for urbanization, tourism development, mining and industrial agriculture, as well as from the local impacts of climate change. There is a clear challenge to harmonize diverse development goals in land use and management at a landscape scale (Sayer et al. 2013).

Integrated landscape management aims to strengthen local capacities with a sustainable approach.

The Amanalco-Valle de Bravo watershed in central Mexico is an important socio-ecological mosaic. Diverse environmental and socio-economic interests and land uses compete there. It is one of the most important water providers of the Cutzamala System, which supplies 20% of the potable water for Mexico City and its metropolitan area, the most densely populated area of the country. Its scenic beauty makes Valle de Bravo town popular with the leisure and real estate business. Some land is privately owned; most is owned by 53 *ejidos* and *comunidades*. The land owned by the communities[1] provides for their livelihoods and development. Rural communities make their living from agriculture, forestry, local trade and services in adjacent cities.

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The watershed faces two main risks. First, the weakening of rural livelihoods and cultures has facilitated the growth of a new local power, represented by rich land-owners and tourists, who change the landscape by demanding water and land and carrying out new economic activities. This, along with the abandonment of rural activities (agriculture and forestry) and the shift to urban jobs, increases land-use change and threatens rural communities' economic stability, which was once based on their control over land. Second, deficiencies in various production systems, natural resource management schemes and urban management are accelerating the degradation of water, soils, forests and biodiversity. Public policies and other public initiatives neglect landscape complexity and focus on single objectives (such as environmental conservation that restricts productive development), disregarding relationships between multiple rural development stakeholders.

In 2007 the Mexican Civil Council for Sustainable Forestry (*Consejo Civil Mexicano para la Silvicultura Sostenible*, or CCMSS), along with 11 *ejidos* — which collectively own 15,200 hectares in the upper watershed — initiated a project to promote collective action to support sustainable landscape management. The goals were to strengthen local capacities for rural development, protect local livelihoods and increase community control over land and sustainable production systems.[2]

Community-based landscape management

The accelerated weakening of rural culture and livelihoods has prompted the loss of natural capital in the watershed. The most important problems are soil erosion, water pollution, loss of agro-biodiversity and forest degradation. This situation is related to the following issues, which have created a complex socio-ecological landscape.

Lack of land and natural resources for new generations

With the growing population, families have had to divide their land among all their children, losing production potential. In addition, local community regulations mean that only one member of each family inherits the rights to common lands (forests); those without these rights cannot participate in community decision-making. Such individuals have no interest in working in natural resources and landscape protection, since they cannot benefit from it. However, they stay in the region because they are able to find jobs in the service sector.

Loss of value of traditional agriculture

Agricultural policy has promoted the development of industrial agriculture while ignoring traditional farming. Poor rural areas receive assistance that subsidizes consumption, not production. Along with economic and international trade trends, this has diminished the value of traditional farmers' products and lowered agricultural yields and prices to a point where traditional agriculture is not competitive.

Low development of the forestry sector

Although the vast majority of communities in the upper watershed have legally authorized forestry operations for timber production, the sector is poorly developed.[3] Communities sell standing timber to private loggers, but are not further integrated in the value chain. Communities in the lower watershed have abandoned forestry activities because of urbanization, land sales and overregulation of the forest sector, which imposes strict, redundant and burdensome requirements. These bring a high cost to forest owners and users who pursue legal forest management.

Organizational weakness

Organizational and administrative weaknesses hamper communities in the area. A lack of confidence in community authorities, deficient administrative skills and decision-making procedures and inadequate technical and professional structures for implementing community initiatives are key barriers to effective governance.

High demand for land and fresh water for urban and tourist development

As a tourist town, Valle de Bravo is growing steadily, and a new toll highway has led to an increase in real estate activity. There is a rising demand for fresh water, both inside and outside the watershed, to supply Mexico City and its surrounding area.

Environmental impacts of production systems and urban development

High soil erosion rates,[4] decreasing water quality, damage to hydraulic infrastructure, forest and soil degradation and biodiversity loss are the most important environmental impacts of deficient land management practices in the watershed.

Main project activities

In response to the problems described above, four main activities lay at the core of the project.

Governance structures and social capital

Community structures have been strengthened by improving decision-making procedures through information sharing, in-depth problem analysis and planning with *ejido* committees. Instruments for transparency and accountability, internal regulations and administration capacities have also been developed.

Community land use and management planning has been the basis for public and private financing that responds to community needs. The project also ensured the active participation of community members during the design and implementation of funding mechanisms.

The project employs three land-planning instruments. These are also used by other communities across Mexico, but their approaches differ according to their objectives (Anta et al. 2006):

- A Community Land-Use Plan (CLUP) establishes policies for land-use and management planning.
- *Ejidos*/*comunidades* operational plans are part of a process to improve community involvement and participation in sustainable land management and to better organize and administer financial resources.
- Farm planning facilitates the implementation of best management practices and activities at the farm level. Agricultural land-owners develop this planning instrument through a process of internal analysis and communication with neighbouring farmers.

Based on an analysis of problems and potentials, land-owners agree on collective actions. A shared vision of the region's main objectives and goals was put into practice through the coordination and implementation of these projects. To date, the *ejidos* in the watershed have prioritized sustainable forest management, agricultural best management practices, and actions to reduce erosion and improve water filtration and environmental practices. These initiatives are currently being tested, monitored and evaluated.

Best management practices and landscape restoration

Given the region's socio-ecological mosaic, the project takes into account several territorial scales: watershed, sub-watershed, *ejidos*, *comunidades*, forest harvesting areas and agricultural parcels. It also considers the diverse social entities in the region: producers, family units, the *ejido* assembly[5] and the *Unión de Ejidos Forestales Emiliano Zapata*.[6] Each entity has its own strategies, but also supports the collective goals for managing the watershed and integrating its actions in a common regional framework.

The project has fostered participatory and community-driven land and natural resource planning. This harmonizes *ejidos'* and farmers' livelihoods through enhancing environmental services, capacity building and knowledge sharing. These efforts have strengthened small-scale farmer agriculture and sustainable forest management by sharing traditional local knowledge and putting improved techniques into practice. This in turn has promoted the regeneration of degraded areas and the sustainable use of forest ecosystems, based on improved management practices and increased efficiency and productivity.

Integration of production chains

Forest management and agriculture face multiple challenges that diminish the value of their products. As a result, communities have abandoned these activities in order to pursue job opportunities elsewhere. Given this context, the project is testing new techniques to improve productivity in the region and to integrate production chains that add value to existing forest and agricultural products.

Instruments for financial co-responsibility

Changing deficient land management practices and implementing integrated and sustainable management schemes have several costs, including the transaction costs of developing collective initiatives. It is fair that all users who benefit from landscape management contribute to paying the costs of collective initiatives. Payments for watershed services (PWS) and REDD+ instruments are two options for delivering revenue. PWS and carbon markets must consider communities' views and interests in order to achieve robustness, long-term viability and effectiveness.

CCMSS has designed a local PWS mechanism that allows users, governments and others to jointly contribute to the implementation of integrated landscape management plans that are developed by communities. Payments are structured according to the various types of land use and activities, which respond to local socio-ecological complexities.[8]

CCMSS is also developing a proposal to operate local REDD+ projects that are designed and carried out by local communities. These are nested in REDD+ initiatives at the state or regional level so that they can be scaled up to a national approach, in order to guarantee a coherent implementation of Mexico's REDD+ strategy.[9] The goal is to link rural development strategies at the landscape scale with the improvement of productive systems and local governance structures.

Success factors

Although the historical, ecological, political and social circumstances of the Amanalco-Valle de Bravo watershed are unique to it, the CCMSS project provides useful insights into the design and implementation of community-driven integrated landscape management in general. The project's management model is likely to be replicated since it is based on collective agreement and action around land-use planning and management. It includes diverse actors interacting at multiple scales to achieve consensus-building processes and carry out activities that respond to a common agenda. Based on this experience, six main aspects have been identified as factors of success for sustainable rural landscape management:

Scale

Successful interventions require working with the diverse management units (farms, forest management units, communities, watersheds) that are nested in landscapes. Planning instruments should tailor actions to various scales, always considering how to take advantage of objectives and strategies developed at other scales. A range of planning, implementation and monitoring approaches is required from management unit administrators.

Capacity building

It is necessary to invest in capacity building among stakeholders (land-owners and land users) in order to strengthen their ability to design and collectively implement sustainable management plans and to use best practices in management and landscape regeneration. This was achieved by empowering the *ejidos* and strengthening farmer groups through improved administration capacities and decision-making processes, increased funding opportunities and the development of land planning and management instruments as well as best management practices and techniques. It is important to take advantage of existing local knowledge and traditional decision-making mechanisms.

Knowledge sharing

Creating a dialogue — where land-owners, users and producers share and exchange their knowledge on best agricultural and forestry management techniques — is a necessary condition for identifying cultural values around landscapes, integrating traditional uses of natural resources and determining best practices.

Social governance, collective decision-making and participation mechanisms

Landscape management initiatives must work with and strengthen existing governance structures. The *ejido* assembly and the decision-making process led to the consolidation of CLUPs, *ejido* operational plans and farm planning, and supported a local monitoring and evaluation system. This shows that despite the multiple challenges facing collective action, it is possible to create integrated and coherent land management that reconciles diverse interests and land uses. The weakness of existing social structures — and the existence of public policies that undermine community organization and favour individually led activities and centrally-made decisions — have been the most difficult challenges to the project's long-term success.

Resilience and multifunctionality

Land-use strategies and interventions should be multi-purpose in order to address the multiple interests in a landscape. In Amanalco, rural livelihoods rely on a range of landscape use strategies, including agriculture, cattle raising, forest management and provision of environmental services. It is possible to reach a diversity of goals and generate several different products and services within each land use, instead of relying on one aspect. This diversification diminishes dependency, increases resilience and helps reveal the importance of various land uses and productive systems and their interconnections.

Co-financing schemes

Because it is often difficult to find financing for landscape management, PES or REDD+ mechanisms can be useful. However, these instruments should emphasize co-responsibility and should not impose foreign views on local problems.

The CCMSS project aims to strengthen *ejidos* and *comunidades* in order to improve local livelihoods and governance structures, increase the local economy, and prevent deforestation and forest degradation. The experience gained demonstrates that success depends both on the collective agreement and action around land management and on the use of community land planning instruments to identify and address the needs and interests of the local population while producing benefits at the local and regional level. Community-led landscape management projects should inform public policy frameworks (such as REDD+ and PES) so that decisions are based not on a single objective, but on a landscape approach. Public policies must be adapted in order to function in complex socio-ecological circumstances.

Further information

For more information on the project, visit: http://amanalco.ccmss.org.mx. Additional information on CCMSS community-based forest and landscape management projects in Mexico can be found at www.ccmss.org.mx.

Endnotes

1. Following a substantial body of related work, the term "communities" refers to *ejidos* and *comunidades*.
2. In 2013 CCMSS received the Land for Life Award from the United Nations Convention to Combat Desertification; see www.unccd.int/en/programmes/Event-and-campaigns/LandForLife/Pages/default.aspx. Video is available at http://youtu.be/V_KN-McTv_M.
3. Under Mexico's General Law for Sustainable Forest Management, the Ministry of Environment and Natural Resources authorizes timber harvesting by communities. As part of the requirements to obtain authorization, producers first need to develop a forest management programme. See: *Ley General de Desarrollo Forestal Sustentable* (General Law for Sustainable Forest Management), published February 25, 2003: www.diputados.gob.mx/LeyesBiblio/pdf/259.pdf.
4. Soil erosion rates are higher than 50 tonnes/ha/year in 20% of the watershed.
5. The *ejido*, or community assembly, is constituted by its members, who designate a *comisariado* (a representation and managerial body) that makes decisions on common property resources and internal *ejido* affairs. The assembly is mandated by the Mexican Agrarian Law.
6. The *Unión de Ejidos Forestales Emiliano Zapata* is composed of eleven forest *ejidos* that manage and protect their forests.
7. The local PWS mechanism operates a trust fund to receive contributions. The National Forestry Commission covers approximately half of the implementation costs.
8. For more information on the proposal developed by CCMSS for PES, see Madrid (2012).

9. For Mexico's draft version of the National REDD+ Strategy, see *Comisión Nacional Forestal*/ National Forestry Commission, *Estrategia Nacional para REDD+ (ENAREDD+)*, April 2014. www.ccmss.org.mx/descargas/ENAREDD_abril_2014.pdf.

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3.5 Productive landscapes through leasehold forestry in Nepal

KENICHI SHONO, SIMMATHIRI APPANAH, PATRICK B. DURST, YURDI YASMI, GOVINDA KAFLEY, JIM HANCOCK and BRETT SHAPIRO

Introduction

Community-based leasehold forestry is Nepal's pioneering approach to reverse deforestation and land degradation by involving and benefitting poor communities. The approach began in Nepal about 20 years ago and has two main objectives: regenerating forests on degraded lands; and alleviating rural poverty. Under the system, the Nepalese government leases state-owned degraded forest lands to small groups of poor households. The state requires the households to protect their forest lands against further degradation and allows them to cultivate economically beneficial annual and perennial plants while simultaneously allowing the forests to recover through natural regeneration and selective planting of trees, mostly native species. Leasehold forestry has been highly successful in rehabilitating degraded landscapes while improving the socio-economic status and well-being of poor rural communities in Nepal.

The landscape approach links productive aspects of forestry, livestock and agriculture.

The people and forests of Nepal

Nepal is a landlocked country in the Himalayas, with a total area of 147,181 km^2 and a wide range in altitude. The country is rich in biodiversity, natural resources are abundant, and various agro-climatic conditions are favourable to developing food and cash crops. However, the physical isolation and rugged terrain of Nepal's hilly and mountainous regions make it difficult to carry out economic activities and deliver services.

Nepal remains one of the poorest and least developed countries in the world. About 83% of its population of 26.6 million people live in rural areas, where household food security and poor nutrition are still major concerns (Government of Nepal 2011a; 2011b). These rural communities are generally landless or have very small landholdings, and are

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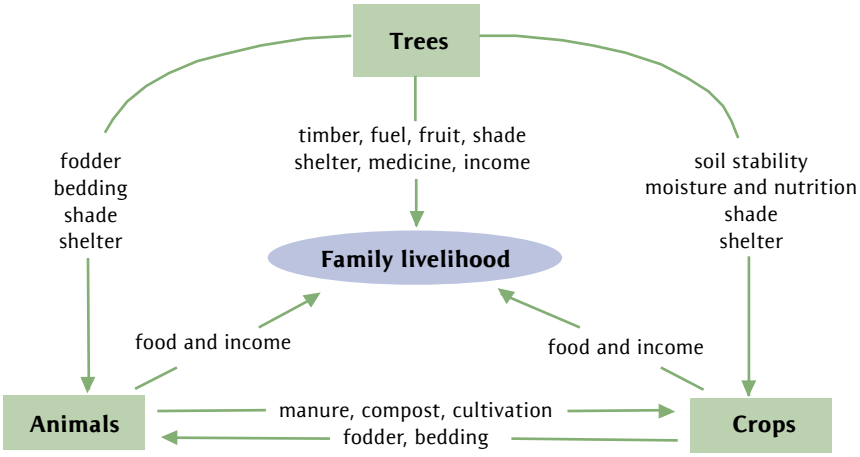
concentrated in specific ethnic, caste and minority groups. The most vulnerable and marginalized groups are the lowest social castes, indigenous peoples and women.

All forests are state-owned; they cover about 25% of the country. Another 13% of Nepal is covered by other wooded lands, including shrubs and bushes (FAO 2010). Forest resources have been declining in Nepal over the past decades, mainly as a result of population growth and demands for energy, fodder, food, etc. Between 1990 and 2010, Nepal lost 24.5% (1,181,000 hectares, or ha) of its forest. During the same period, other wooded lands with less than 10% canopy cover increased by 60.8% (to 717,000 ha). Conversion to agriculture and excessive extraction of resources were the driving factors in deforestation.

Despite degradation and a dwindling resource base, forests remain the basis of rural livelihoods; they provide fodder for livestock, stabilize the soil, furnish suitable agricultural land under their cover, and yield useful non-timber forest products (NTFPs). Figure 1 illustrates the links between forest, livestock and agriculture in the Nepali family farming system.

Figure 1. Nepal's tree/animal/crop farming system



Source: Tamraker 2003

The emergence of leasehold forestry

As forests disappeared, people — especially women — were forced to spend more time collecting fodder and fuelwood, which led to a drop in the supply of agricultural labour and to decreased production and food security (IFAD 2008). Community forestry was introduced in the late 1970s as one way to address these issues; under this approach, state-owned forests were handed over to local communities to manage and utilize. However, as time passed, it became clear that the poorest people within the community were being excluded from community forestry.

To improve the livelihoods of the poorest rural households while halting forest degradation, the Nepalese government launched the Hills Leasehold Forestry and Forage Development Project (HLFFDP) in 1993. The *Forest Act, 2049* (1993) and Forest Rules 1995 provided the legal framework for leasing forest lands to the poor.

HLFFDP was followed by the Leasehold Forestry and Livestock Programme (LFLP) in 2004.[1] The LFLP is being implemented in 22 mid-hill districts of Nepal, where poor communities live in a mixed landscape comprising degraded forest lands, villages and agricultural areas. The overall goal is to achieve a sustained reduction in poverty for 44,300 poor households who have been allocated leasehold forestry plots. The programme has four objectives:

- improve the availability of fodder and tree crops from sustainable management of leasehold plots;
- improve household benefits from small livestock;
- establish viable microfinance institutions to provide services to leaseholders; and
- enhance the government's capacity to implement leasehold forestry as a national poverty reduction programme in a gender-sensitive way.

How leasehold forestry works

Prospective leasehold forestry user groups (LFUGs) must first undergo a social assessment. Conducted by the District Forestry Office, this assessment determines if they are eligible (households living below the poverty line and owning less than 0.5 ha of land). These groups comprise a small number of households living close to the designated leasehold forest area; cooperatives are formed by aggregating the LFUGs at the village or other level. The government provides up to one ha of state-owned degraded forest land to eligible LFUGs in the form of a lease contract. Leases last for 40 years, with a provision to be extended for another 40.

The lease enables the recipient household to exercise similar legal rights to a private land-owner. The government requires the groups to protect their forest land against degradation from open grazing, forest fires, soil erosion, etc., either for the purpose of enhancing the natural regeneration of trees, shrubs and grass or to cultivate economically beneficial perennial plants. Open grazing of livestock on the leasehold forestry land must be replaced by stall feeding. Since the land is designated as forest land, only those plants classified as providing NTFPs are allowed to be planted. Leasehold groups are authorized to harvest forest products, except for remnant forest trees (which remain the property of the government), for subsistence use or sale to outsiders. Leaseholders can transfer or sell their rights to others after they have successfully completed one-third of their lease period. District Forestry Offices monitor the implementation of planting and harvesting activities in the leasehold forestry sites.

District forestry and livestock service officials help the LFUGs prepare a group-level forest management plan. LFUG members are also provided with technical advice and training to help them restore the forest on their plots and start income-generating activities. The groups are also provided with basic material, such as seeds, in order to reduce investment costs that they would otherwise not be able to afford.

Landscape-level agroforestry model

A landscape approach was adopted at the programme sites. The key sources of income and subsistence in the area — livestock, forestry and agriculture — were integrated in a participatory land-use planning process that encompassed both community-owned and privately owned lands (including non-leasehold lands). The process resulted in the preparation of a livelihood improvement plan for each group and household. The plan considered all the resources available to the communities in order to address their present needs and future hopes. The leaseholders were encouraged to be involved in determining the future of their land and in shaping programme activities and outputs. Through this participatory process, stakeholders explored how leasehold forestry could contribute to the restoration of a productive landscape that can provide a wide range of products and services to fulfill the social, economic and environmental requirements of present and future generations.

Many of the degraded leasehold sites were initially planted with *Thysanchaena maxima* (broom grass) and a number of other fodder species, based on the respective forest management plans; this provided revenue and enhanced fodder availability to improve the livelihoods of poor households in the short term. Community nurseries were also established to propagate various high-value NTFP species such as *Cinnamomum tamala* (Indian bay leaf), *Zanthoxylum armatum* (Nepalese pepper), *Asparagus racemosus*, *Amomum subulatum* (cardamom) and *Edgeworthia gardneri* (Nepalese paperbush) as well as selected timber species, including *Fraxinus floribunda*, *Garuga pinnata*, *Ficus* spp., *Acacia catechu* and the native species *Schima wallichii* and *Castanopsis indica*. These species were either interplanted among the fodder species or planted in untreated degraded sites to provide longer-term income diversification and restore trees to the deforested lands.

Livestock is inherently linked to agriculture and forest management and is an integral part of rural livelihoods in the mid-hill districts. For this reason, livestock was included in the leasehold forestry programme as a fundamental component, through inter-ministerial cooperation between the Department of Forests and the Department of Livestock Services. Recognizing that open grazing of goats had contributed to the degradation of deforested lands and prevented the natural regeneration of native plant species, the programme promoted the planting of forage species, typically covering around 30% of the leasehold plots, which allowed the leaseholders to switch from open grazing to stall

feeding. This provided multiple benefits, including increased availability of manure, reduced pressure on the land (which allowed natural regeneration of native plant species), and more time for women to pursue other productive activities. LFLP, in collaboration with the District Livestock Services Offices, provided additional training and technical assistance in animal husbandry to further improve livestock productivity and income generation.

Impacts and sustainability of leasehold forestry

FAO, in collaboration with district government officials and LFUG members, has been monitoring the outcomes of leasehold forestry on an annual basis through household surveys. A comprehensive assessment by FAO and partners is underway that will evaluate the programme's socio-economic, ecological and environmental benefits. Analysis of monitoring data to date indicates that combining livestock with forestry has yielded rapid positive results; these are generally not possible with forestry projects that are based on trees.

Restoration of degraded forest lands

Most leasehold sites were severely degraded before the programme began. Sites commonly had very sparse tree cover and were dominated by invasive weeds such as *Chromolaena odorata* and *Lantana camara*, which prevented the natural regeneration of native plants. Under the programme, many of the sites were cleared of invasive weeds and planted with broom grass and other fodder species. Average ground cover in new sites before leasehold forestry was about 32%. This rose rapidly to 50% after one full growing season, and gradually increased to almost full coverage in sites after seven years. About 61% of the LFUGs reported an increase in canopy and ground cover of native and other useful plant species on their leasehold forest land. The increase in vegetation cover has helped reduce soil erosion.

Social benefits

A total of 7,419 LFUGs (75,021 households) have been formed, which are managing about 42,835 ha of leasehold forests. In addition, the emergence of cooperatives and voluntary groups of several LFUGs has been a significant development. Social mobilization has strengthened links among people, and leasehold activities made them eager to engage in additional economic activities. The formation of 120 intergroups and 54 multi-purpose cooperatives, involving 1,600 leaseholder groups, allowed savings to be achieved and marketing initiatives to be developed. Group savings is an essential element in each LFUG; it is the means for providing small loans to members. The existence of these groups also brought in grants to build culverts and bridges, improve trails and footpaths, renovate schools, and complete small projects related to the supply of drinking water.

The success of each programme site depended to a great extent on the dynamism and cohesion of these groups. A group assessment conducted by FAO in 2012 analyzed 5,042 groups and found that even among groups that were 15 years old or older, 62% were somewhat or very active, long after programme support had ended (FAO 2012). The key factors that contributed to some of the groups becoming inactive were outmigration; low fertility of the land handed over to them; lack of regular follow-up by the District Forestry Offices; and conflicts within groups. Individual members interviewed during missions were adamant about never relinquishing the user rights that they obtained from their group. This makes it more likely that leasehold forestry will be sustainable.

Improved livelihoods

After five to seven years, programme interventions resulted in a considerable increase in annual household incomes, mostly from the sale of broom grass in the early years, but also from increased livestock production. Participatory assessments conducted in 2006 and 2013 showed that the proportion of the poorest households decreased from 41.4% to 19% between those years in the programme sites. More than 93% of households saved money on a monthly basis, and 77% of the saved amount has been mobilized as soft loans (with a below-market rate of interest) for members.

One of the programme's most significant results was the increase in animal feed, which decreased the average time that women had to spend to collect forest-based fodder. Together with the increased availability of fuelwood inside leasehold sites, households saved up to eight hours per day. This meant that women had more time to pursue other productive activities, such as literacy and vocational training and income-generating activities. Almost half of the new cash earners were women.

An increase in fodder also enabled leaseholders to switch from open grazing to stall feeding. This reduced the pressure on forest land and increased the availability of manure, which can be used to improve soil fertility. The increased availability of fodder and access to credit also allowed a number of poor households to purchase and keep livestock. The average number of goats owned by leasehold forestry households increased from 3.6 at the onset of the programme to 6.12 over a five- to seven-year period.[2] As a result, more livestock products are now sold and consumed in leaseholder communities.

The combination of improved agricultural production and increased livestock has increased food production and improved food security in leaseholder communities. Before the programme, 58.3% of the households had food security for less than three months per year. After the programme, this proportion had fallen to 6.7%, and 11% of households now have sufficient food for the whole year.

Other social benefits

To assist in the formation and support of groups, 174 female group promoters were recruited under the programme. They proved to be fundamental to creating and sustaining the groups and strengthening women's decision-making. According to a monitoring survey conducted in 2013, women comprised 42% of LFUG executive committee members.

Another important social benefit of LFLP was the clear gains that group members made in confidence and self-esteem. They were far more ready to engage officials in discussions about their needs and problems. In addition to the financial services that cooperatives dispense, they provide training, bargaining power, market information and a forum for decision-making, which women are often a central part of.

Because there was less need for children to herd grazing animals, school attendance also increased among the LFLP households.

Conclusions

Several key factors contributed to the success of leasehold forestry in Nepal. These lessons could enhance efforts to restore degraded landscapes through pro-poor forestry in other parts of the world:

- Generate short-term income to improve livelihoods, combined with long-term economic benefits and environmental services through the restoration of forest land.
- Focus on the needs of the poorest communities, paying particular attention to avoiding elite capture and ensuring the equitable distribution of benefits.
- Provide secure, long-term tenure with clear rights and responsibilities that are supported by supportive legislation and policies.
- Use a participatory approach through which leaseholders help shape project activities and determine the future of their land.
- Use income generated from the sale of forest products through farmer cooperatives to fund village development and other initiatives.
- Ensure that there is strong inter-ministerial (cross-sectoral) collaboration.
- Take a gender-sensitive approach to strengthen the decision-making role of women by including them in key positions of LFUG executive committees.
- Use the landscape approach, which links productive aspects of forestry, livestock and agriculture, considers the needs and aspirations of present and future generations of local communities, and is based on available resources and livelihood options.

Despite the programme's overall satisfactory performance, several challenges in further scaling up and improving the effectiveness of leasehold forestry have been identified:

- the need to further integrate leasehold forestry (which focuses on the poorest communities and restoration of severely degraded forest lands) and community forestry (which typically includes less degraded forest areas and households that are relatively well-off) so that these complementary programmes can function in a mutually beneficial manner;
- a lack of clarity on the process and rules related to inheritance of the lease from a group member to his or her children; and
- the need to provide incentives for transforming the leasehold site (initially planted with broom grass and other fodder species) to an agroforestry landscape with a significant tree component in order to diversify income sources.

The agroforestry-based leasehold forestry model developed through the LFLP has proved highly successful. The technical assistance it provided has established a solid foundation for scaling up leasehold forestry to bring wider socio-economic changes to poor rural communities in Nepal. Strategic recommendations to the Government of Nepal for further improving and expanding leasehold forestry in the country include: 1) strengthening the capacity of LFUGs to cope with second-generation issues; 2) exploring technological innovations to optimize outputs; and 3) institutionalizing lessons learned in order to scale up successful intervention to other potential areas.

Endnotes

1. The International Fund for Agricultural Development (IFAD) provided financing to both projects, and the Food and Agriculture Organization of the United Nations (FAO) has provided technical assistance since the beginning, with financing support from the Governments of the Netherlands and Finland.
2. This does not take into account goats that may have been sold in the interim.

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3.6 Turning degraded land into productive landscapes, Ethiopian highlands

GEORG DEICHERT, FRIEDERIKE KRÄMER
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Background

Can degraded land be turned into productive landscapes? This is what Ethiopia wants to prove. Highland areas in the country face severe land degradation due to inappropriate land use and deforestation, mainly triggered by a growing population, pressure on natural resources and the effects of climate change. In 2008 the Ethiopian Ministry of Agriculture, with the support of various partners, initiated the Sustainable Land Management Program (SLMP) in five regions — Amhara, Oromia, Tigray, Benishangul Gumuz and Gambela — to address these challenges (see also article 3.1 for Oromia). The aim is to reduce land degradation and make agricultural landscapes more productive. This article describes experiences in the highland regions of Amhara, Oromia and Tigray, where *Gesellschaft für Internationale Zusammenarbeit* (GIZ) was a partner.[1] Smallholder farmers are the focus of the programme, which uses a community-based participatory watershed development approach.

The SLMP landscape approach

From the SLMP's perspective, productive landscapes are capable of providing a wide range of products and ecosystem services. They can also meet the social, economic and environmental needs of present and future generations at the local, national and global level. The landscape approach goes beyond a traditional watershed management process, with a stronger focus on and better integration of social development, environmental sustainability and economic development efforts. The landscape approach also seeks to better understand and recognize the connections between different land uses and stakeholders by integrating them into a joint management process. This provides the opportunity to better handle trade-offs and to achieve synergies.[2]

The landscape approach goes beyond a traditional watershed management process.

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The SLMP approach centres on community participation and participatory forest management (PFM). It promotes sustainable forest use, rather than forest protection measures only; it also links soil and water conservation (SWC) measures with income-generating activities (IGAs) and with initiatives to address climate change. The preparation of participatory watershed development plans is an important part of this process. It addresses the need to communicate desired outcomes and the disparate components of landscape functioning, trade-offs and performance to the target communities.

Implementation of SLMP

Through its landscape approach, the SLMP aims at community-based resource management in order to achieve sustainable productive livelihoods. The programme sites are areas in micro-watersheds with severely degraded land. In order to turn these degraded areas into productive land, communities undertake various site-specific soil and water conservation measures. The Ministry of Agriculture is in charge of implementation and operates through a multi-level structure, from federal to regional, *woreda* (district) and *kebele* (village) level. All stakeholders work to create awareness, responsibility and ownership at the community level. Implementation consists of three phases.

Initiation phase: identifying micro-watersheds, organizing communities and planning

Before restoring a degraded watershed MOA's field staff create awareness of soil degradation on the part of community members and the local administration. Local committees and user groups are then established. Watershed management requires a multidisciplinary perspective and multi-stakeholder activities to negotiate goals and priorities and implement actions. The organizing communities must clearly define and agree on the desired objectives and outcomes and assess the current and future factors that will influence the process.

The landscape approach in SLMP watersheds combines natural resource management with environment and livelihood considerations. Optimization of production and resource use is dealt with at the landscape scale rather than at the individual farm level. Community watershed teams are formed to prepare watershed management plans; these plans include reclamation of eroded land, conservation of soil and water resources and intensification and diversification of agricultural production.

User groups then engage in specific economic activities. For physical reasons, watershed rehabilitation starts on the slopes and moves from there to the valleys. The greatest investments are required on the slopes, while the returns are usually highest in the valleys. This means that close cooperation is required by community members and that appropriate incentives must be provided to land-owners on slopes from the beginning. Cooperation is supported by the creation of the community watershed teams for the entire micro-watershed and additional user groups for specific resources. These groups receive regular project support in the form of training. This participatory, bottom-up approach has the potential to make a large-scale impact, since it promotes collective action and ownership by the people involved and can address obstacles in a targeted way.

Rehabilitation phase: implementing soil and water conservation measures

Watershed management starts from the top of the watershed. The first priority is reducing the speed of the run-off and increasing water infiltration into the soil. SWC measures (terraces, trenches, gully structures, etc.) need to be identified that are suitable to specific situations. They need to be combined with biological measures, such as forage planting on embankments. SWC measures should be used so as to improve water retention and soil fertility, while at the same time reducing soil degradation, stocking rate and deforestation.

Better soils and greater water availability enable communities to intensify agricultural production and reduce the pressure on land. One key factor in the success of landscape restoration is increased participation in and ownership of the forest areas by local communities through PFM. Forests and trees are an important part of the watersheds.

Forest areas in Ethiopia's highlands are increasingly threatened. Growing population pressures have led to expansion of agricultural land and high demands for fuel and construction wood. Furthermore, uncontrolled grazing in the forests is common and endangers the SWC activities implemented in the adjacent SLM watersheds. This over-exploitation of forest resources in Ethiopia has left less than three percent of the country's native forests untouched (World Bank 2010).

The Forest Development, Conservation and Utilization Proclamation of 2007[3] allows for increasing community participation in forest management[4] and permits forest areas to be handed over to communities for use and conservation. The sustainable use of wood and non-timber forest products (NTFPs) is considered to be an integral part of the approach to productive landscapes. Besides providing direct benefits to community members, forests have ecological benefits in terms of soil erosion and water-holding capacity.

Economic development phase: activities that generate revenue

Once rehabilitation measures have been implemented there are increased opportunities for direct economic benefits for individual farmers and households. IGAs include production of crops, vegetables and fruits, bee-keeping, various wood products and NTFPs as well as livestock production. When selecting IGAs to pursue, community members should keep in mind that the maximization of economic benefits often depends less on the type of IGA than on the way it is practised. Furthermore, a high production rate does not automatically bring higher economic benefits to the producer.

Marketing and profitability issues are very important to the sustainability of the landscape approach. Successful and lasting market linkages strengthen business opportunities for farmers and subsequently support the successful implementation of IGAs. The landscape approach in the SLMP will be sustainable only if farmers generate tangible profits from IGAs. The profits must be high enough to generate income or support subsistence and to compensate for the labour and inputs for the maintenance of SWC measures. These challenges are being addressed by linking marketing issues to a government programme on agricultural growth that promotes marketing and value chains.

Since climate change is already affecting smallholder agriculture production in the Ethiopian highlands, some IGAs should also address climate concerns. A climate assessment should ideally be done during the process of preparing the micro-watershed development plans. Presently, a screening is being done under the framework of the Global Climate Change Alliance, which was initiated by the European Commission in 2007.

Climate-smart agricultural technologies are supposed to strengthen adaptation and contribute to mitigation of climate change impacts, while at the same time creating financial benefits for the farmers, e.g., through payments for environmental services. Similar to economic benefits, adaptation and mitigation effects depend mainly on the quality rather than the type of activity. A large number of climate-smart measures are available, including composting, mulching, crop rotation, crop diversification and use of crop residue. The frequently proposed use of improved crop varieties should be considered cautiously, since the higher yield often requires higher chemical inputs. Even the resilience of "improved" varieties bears an additional risk element; e.g., a drought-tolerant variety might underperform in a season when the drought does not occur. The selection of climate-smart measures also has to consider the effect on the tasks and benefits of women. Women's participation is promoted in income-generating activities, and their representation in committees and user groups is strengthened through separate consultation meetings.

Impacts of the SLMP

Around 180,000 hectares (ha) of degraded land have been rehabilitated through SLM measures, benefiting around 194,000 households. These positive results were achieved in a multi-level approach through the provision of capital investment, technical assistance and capacity building for smallholder farmers in the watersheds and government institutions at national and sub-national levels.

Impacts on the constructed slopes are encouraging: embankments with bio-measures have been effective in increasing water infiltration and farmers say that crop productivity has increased. Downstream, more water is available for longer periods; in one micro-watershed, small-scale irrigation has increased from 35 ha to 85 ha, benefiting 60 instead of the original 35 households. Since 2008 the irrigated area has increased to 1,800 ha. Farmers have switched to high-value crops on irrigated fields and organized themselves for marketing.

The planning and implementation capacities of government structures have improved. To date, 678 watershed management plans have been developed and implemented with active community participation. Institutional capacities at the village and individual level are significantly improved. Around 60,000 farmers and producers, who are organized in 500 user groups, manage watersheds with SLM measures. They jointly plan measures, implement them and contribute to monitoring them. Common resources are used in

accordance with local rules that are established by user groups; these user groups also ensure compliance with the rules and fine rule-breakers. Farmers are changing cultivation and husbandry practices to those with better climate adaptation and mitigation effects.

Challenges

Although there is broad consensus among the government and its partners on the types of landscape interventions to pursue, there is a lack of clarity about actual outcomes, and how to achieve and measure them in terms of social, ecological, economic and climate change benefits. This is due to insufficient harmonization of interventions among development partners, especially with regard to watershed and climate indicators.

Several challenges arise from the landscape approach, relating to institutional, human and technical aspects. The holistic landscape approach poses tremendous institutional challenges to the implementation structure, since many different departments and ministries are involved and must coordinate their efforts.

For example, in 2008 the Government of Ethiopia approved the first Ethiopian Sustainable Land Management Investment Framework (ESIF). Its goal is to provide a national-level strategic planning framework for investments in sustainable land management by the public and private sector. Although the ESIF policy document gives some direction it does not sufficiently link the various development partner contributions. To face this challenge the natural resource management sector of the Ministry of Agriculture is working to improve the framework conditions for sustainable land management and is developing a joint monitoring and evaluation system. Further joint planning of activities and indicators, budgeting and reporting on contributions from all development partners should substantially simplify monitoring and enhance harmonization.

Conclusions

The SLMP approach demands a high number of trained and well qualified staff. At the national level the programme has limited staff (the Programme Coordination Unit, or PCU); it works through existing staff and structures at the decentralized levels. This includes technical experts as well as development agents in the field, who receive support and training from the development partners. Staff may be well qualified in specific tasks, but may not have a holistic view of a landscape approach. Capacity development focuses on technical issues, but also considers these more holistic needs.

Establishing sustainable user groups is an important element for the operation of productive landscapes. They are crucial to the operation and maintenance of the SWCs and to sustainable watershed management in general. Establishing these groups requires strong community facilitation and development skills at the village *(kebele)* level.

In order to ensure the sustainable maintenance of SWC measures, communities need to receive economic benefits as soon as possible. Since these benefits may take a few years to occur, the transition phase might need special support.

In order to implement PFM, the communities' land-use rights need to be confirmed and legalized. Although national guidelines for PFM are in place, it remains challenging to promote the understanding of forests as a productive resource, including firewood.

The screening, rating and monitoring of climate-smart measures is still a huge task for SLMP. Ultimately, stakeholders will have to find the right site-specific balance between social, ecological and economic aspects in order to achieve sustainable productive landscape management. The experiences of the SLMP will eventually be documented as best practices and it is hoped that these will be utilized by other regions.

Further information

A project description is available on the GIZ home page: www.giz.de/en/worldwide/18912.html. See also the Sustainable Land Management Program Knowledge Base: www.slmethiopia.info.et.

Endnotes

1. Commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ), GIZ is the major provider of capacity development support to the Natural Resource Management Directorate of the Ethiopian Ministry of Agriculture, its national programme coordination unit and its decentralized structures on regional and district level. The technical contribution of GIZ complements the financial support for SLMP provided by the World Bank, KfW, the European Union and the Canadian, Finnish and Norwegian governments.
2. See the Global Landscapes Forum: www.landscapes.org/global-landscapes-forum-outcome-statement, accessed April 25, 2014.
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3.7 Conservation of agrobiodiversity in landscape mosaics, Nepal

DUNJA MIJATOVIC and SAJAL STHAPIT

Introduction

Landscape approaches have garnered increased attention as a means to harmonize food production, biodiversity conservation, rural livelihoods, the provision of ecosystem services and other objectives (Sayer et al. 2013). Agricultural biodiversity or agro-biodiversity is a key link among these multiple objectives, and can make an important contribution to supporting food production and biodiversity conservation goals in the face of environmental change.

Agrobiodiversity is the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels that sustain the structure, functions and processes of production systems (FAO and PAR 2011). It includes crop genetic diversity and wild and cultivated non-food species as well as species of importance to ecosystem function for pollination, control of plant, animal and aquatic pests, and soil formation and productivity.

Crop genetic diversity comprises local crop varieties and crop wild relatives (CWRs), the wild species genetically related to crops and other domesticated plants. Areas that are particularly rich in diversity are known as centres of origin and diversity. In these places, crops have been domesticated and differentiated into a large number of varieties as a result of a long history of cultivation, environmental heterogeneity (e.g., altitude gradients), genetic interactions between crops and CWRs, and cultural diversity. Worldwide, there are 50,000–60,000 CWRs, largely found in uncultivated parts of pastoral and agricultural landscape mosaics (Vincent et al. 2013). Genetic exchange between CWRs and cultivated varieties is a part of the evolutionary processes of crop adaptation to changing environmental and ecological conditions. CWRs contain important traits for resistance to biotic and abiotic stresses, including pests, disease, drought and salinity.

The conservation of agrobiodiversity increasingly requires a landscape perspective.

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Spatial patterns of crop genetic diversity

Spatial patterns of crop genetic diversity can be the result of certain crop varieties being selected for planting in different soil types, at different altitudes, or by different ethnic groups within an area. Generally, spatial patterns are shaped by the interaction of environmental, ecological, cultural and economic factors. This is illustrated by an interdisciplinary study in the Ethiopian highlands, where the crop genetic diversity of barley is a combined function of biophysical features (e.g., gradients of elevation and associated geographical isolation), difference in farmers' planting preferences and seed exchange networks (Samberg, Shennan and Zavaleta 2010; Samberg, Fishman and Allendorf 2013).

In traditional agricultural systems, the management of genetic resources is closely related to that of forests, wetlands and other types of habitats that host CWR, pollinators and other components of agrobiodiversity. The interactions between cultivated and wild components of agricultural landscapes contribute to agricultural productivity by providing ecosystem services, including soil erosion control and the moderation of extreme weather events such as floods and droughts. In this way they increase the landscape's capacity to support crop genetic diversity in the face of climate change (Philpott et al. 2008; Reij, Tappan and Smale 2010). To benefit from these links between the cultivated and "wild" parts of the landscape, agrobiodiversity requires spatially explicit, community-based management of its various components, including local varieties, wild species and land-use diversity. These are some key dimensions of such an approach, whereby conservation of crop genetic diversity is integrated with forest conservation and restoration:

- cultivation of local varieties adapted to diverse soil and climatic conditions;
- development of a mosaic of land uses, including wild and cultivated habitats;
- community-based ecosystem protection and restoration;
- conservation of crop wild relatives;
- use of biodiversity-friendly low-input farming practices (e.g., organic agriculture); and
- documentation and monitoring of biodiversity and associated traditional knowledge.

Agrobiodiversity Conservation Area in Begnas and Rupa, Nepal

An Agrobiodiversity Conservation Area in Nepal illustrates this landscape approach. Located in Kaski District, the landscape is formed of rice terraces, agroforestry gardens, community-managed forests, wetlands and Begnas and Rupa lakes. It is very rich in both wild and cultivated biodiversity. It harbours dozens of local rice varieties that are adapted to various agro-ecological niches as well as a significant number of local varieties of vegetables. Thirty years ago, uncontrolled deforestation of the hillsides took place. This caused the lakes to silt up and undermined the local livelihoods that depended on the fish in the lakes. Reforestation of the hillsides began with the support of CARE Nepal and local community organizations. Over the last three decades, the Rupa Lake watershed has been transformed through community-based biodiversity management (CBM), an approach developed and promoted by a Pokhara-based NGO, Local Initiatives for Biodiversity, Research and Development, or LI-BIRD (Sthapit, Shrestha and Upadhay 2012).

CBM aims to improve the livelihoods of local communities by strengthening local institutions for conservation, documentation and monitoring of crop biodiversity. The local umbrella organization Jaibik Shrot Samarachyan Abhiyan (Bio-Resources Conservation Movement, or Jaibik Shrot), established a decade ago, oversees three cooperatives/ farmers' organizations and 15 interconnected farmers' and womens' groups (Figure 1).

Figure 1. Members of umbrella organization Jaibik Shrot

Biodiversity-based livelihoods

Every year approximately 110 of a total of 700 member households have access to small loans and skill development opportunities for biodiversity-based income activities (e.g., agroforestry, apiculture). Annual monitoring in 2012 showed that 3,295 of the 5,060 saplings (about 65%) of fodder, medicinal plants and fruit trees that have been distributed since 2008 have survived. This has significantly reduced soil erosion and lake siltation.

Ecosystem and land restoration through cooperation among communities

Land and forest degradation have been addressed through the joint activities of upstream and downstream communities, who are connected through Jaibik Shrot. Upstream communities have undertaken reforestation activities, which have helped to revive the Rupa Lake fishery. In return, 25% of the fishery's profits is invested in upstream areas. This cooperation between the communities has encouraged the enforcement of fishing regulations, the transition to organic biodiversity-rich agriculture, and reforestation, all of which helped to restore the Rupa Lake fishery. Upstream communities can become members of the Rupa Lake Cooperative at a reduced fee; membership earns them dividends from the lake fishery. From 2002 until 2013 the cooperative has grown from 35 to 746 members, which includes most of the households in the Rupa Lake watershed.

Community-protected areas

Habitats for wild rice *(Oryza rufipogon)*, white lotus *(Nelumbo nucifera)*, indigenous fish and migratory birds are protected under community rules. Forests are managed by 18 Community Forest Groups; other groups perform or contribute to various conservation activities. For example, the *Sundari danda* women's group runs a botanical garden with 34 wild orchid species. General awareness and support for biodiversity conservation has increased significantly over the years, as indicated by the undisturbed populations of wild rice and white lotus in and near community-protected areas.

Conservation, monitoring and value addition of local varieties and wild species

Each of the 15 groups affiliated with Jaibik Shrot is entrusted with specific conservation activities, ranging from value addition of local produce to the documentation of biodiversity and associated local knowledge. Community Biodiversity Registers recorded 111 medicinal wild plants and 92 wild species used for food and timber in one landscape (e.g., wild fruits, wild yams, and various timber species). Crop genetic diversity is conserved through a dynamic network of people and institutions who perform critical activities such as documentation, monitoring, crop improvement and value addition. For example, a local variety of sticky rice called *Anadi* — consumed only in special ceremonies — was on the verge of extinction. It has been successfully revived after the last 15 kilos of the rice were distributed to the farmers throughout the landscape. At this time *Anadi* is found in all its agro-ecological niches. Other examples of rare varieties whose production has increased include aromatic *Basaue ghiraunla* (a sponge gourd), *Madale* cucumber and *Panchmukh*e taro. Through participatory plant breeding, a number of local rice varieties have been improved, including Biramphool-3, a cross between local low-yielding aromatic variety Biramphool and the commercial high-yielding aromatic variety Himali. This has increased productivity while maintaining suitability to local agro-ecological conditions.

Some challenges remain with respect to the conservation of the dozens of local rice varieties. They are adapted to various habitats in the landscape, which range from irrigated valleys to rain-fed uplands. Annual monitoring showed a decrease in a number of local rice varieties over the last decade, especially the rice varieties — broadly called

Ghaiya — that are grown in rain-fed uplands. The main reason for the decline of *Ghaiya* is that they require weeding and have a low yield. In order to conserve the important adaptive traits of these varieties, germplasm should be send to the national gene bank for medium- to long-term storage. In the same time, various participatory activities are needed to ensure that farmers have continuous access to such rare varieties (e.g., seed exchanges, seed fairs and a community seed bank).

Finding the right balance between development and conservation

The restoration of the Rupa Lake watershed was achieved through the promotion of biodiversity-based livelihoods (e.g., farm diversification). Perennial and fruit crops are becoming increasingly popular due to their high market value, low labour requirement and high tolerance to elevated temperatures, changing precipitation patterns and drought. The growing network of restored forests, fodder trees, fruit orchards and agroforestry gardens has improved ecosystem services, including soil erosion control and water quality. However, while tree cover on the hillsides has increased, infrastructure development, especially rural road construction, has become a new cause of soil erosion and lake siltation. Jaibik Shrot is working with the local government and its development agencies to find the right balance between development and conservation.

Nonetheless, the transformation of the Rupa watershed has inspired action in surrounding areas and across Nepal. Jaibik Shrot is bringing together the local government, the forestry, agriculture and soil conservation offices, the private sector and local groups to promote biodiversity-based livelihoods in neighbouring areas. In recent years, the local government, LI-BIRD and other stakeholders have expanded the watershed management system employed in Rupa Lake watershed to Begnas Lake; these efforts received the 2014 International ReSource Award for Sustainable Watershed Management. CBM, an approach that largely emerged from the experiences of Begnas, has been widely studied and replicated. Jaibik Shrot and LI-BIRD have been working to incorporate the CBM approach in local, regional, national and global programmes, policies and laws to encourage its wide-scale replication.

Conclusions: linking forests and agrobiodiversity conservation

In the face of environmental and land-use change, conservation of agrobiodiversity increasingly requires a landscape perspective. Greater consideration is needed of the interdependence of the conservation of crop genetic diversity and the restoration and protection of landscape mosaics through community-based approaches. Crop genetic resources are embedded in agricultural landscapes, which are a matrix of agricultural fields, forest and wetlands. The conservation of these resources depends on the ecosystem and evolutionary services provided by wild ecosystems within mosaic landscapes.
To maintain these services, negative agricultural impacts on ecosystems can be reduced

through greater use of agrobiodiversity in production practices, such as locally-adapted low-input varieties and agroforestry. The success of such a landscape approach depends on the existence of community-based institutions that guide collective action and ensure an equitable distribution of resources, benefits, opportunities and knowledge across the landscape.

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3.8 Fostering stakeholder commitment in Western Flores, Indonesia

ADI WIDYANTO, AGUS BUDI UTOMO, THOMAS WALSH and HILDA LIONATA

The Mbeliling landscape

The Mbeliling landscape is an expanse of nearly 94,000 hectares (ha) located in West Manggarai District on Indonesia's Flores Island (Figure 1). Steep gradients dominate the topography of the region: 60% of the area is at elevations from 0–499 metres (m); 35% is at 500–1000 m and 5% is above 1000 m. Tropical semi-evergreen rainforest is found on volcanic rock at elevations between 400 and 1100 m, and tropical wet deciduous forest is found on volcanic rock at elevations below 400 m.

The core area of the Mbeliling landscape consists of locally managed protection forest[1] and production forest, located in the highlands. Most — approximately 35,000 ha — is covered by semi-evergreen rainforest. The protection forest borders other land uses in the hilly countryside, such as mixed agro-forests; these cover just over 34,000 ha and are owned by smallholder farmers. Remnants of a logged-out production forest are also connected to the protected forest. The edge of the landscape is dominated by rice fields, savannah and villages.

New institutions have opened the door to greater grassroots participation.

The semi-evergreen tropical rainforest and tropical deciduous forest are among the highest priority for biodiversity conservation in the tropics (WCMC 1997). These forests are home to several endemic birds. Four are classified as endangered: Flores hanging parrot *(Loriculus flosculus)*, Flores monarch *(Monarcha sacerdotum)*, Yellow-crested cockatoo *(Cacatua sulphurea)*; and Flores crow *(Corvus florensis)*. One, the Flores hawk-eagle *(Nisaetus floris)*, is critically endangered. In addition, the Komodo dragon *(Varanus komodoensis)* is found in the savannah and forest area near the coastal areas in the southern part of the region. Due to the area's rich biodiversity, it is classified as an Important Bird and Biodiversity Area (IBA), known as Mbeliling-Keritamese.

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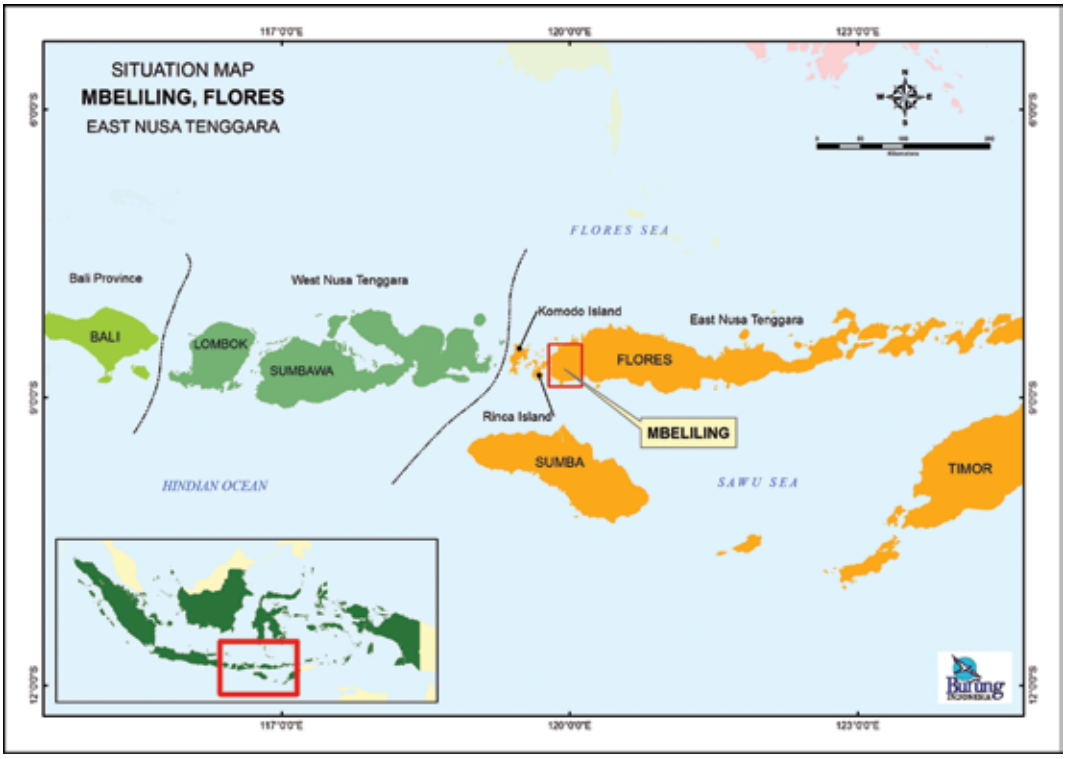
Figure 1. The Mbeliling landscape



Apart from the conservation significance of Mbeliling forests, they are a key water source for agricultural activities and for villages and towns. There are 28 major rivers flowing through the landscape that provide water for both urban and rural areas, including the rapidly expanding tourist destination, Labuan Bajo.

Approximately 34,000 people (7,000 households) live in 27 villages across the landscape, making their livelihoods from agroforestry, rice crops and animal husbandry. Commodities produced from the agroforests include candlenut (from the *Aleurites moluccanus* tree), coffee, cocoa, clove and cashew nut; rice and other food crops are produced mainly to meet the subsistence needs of households.

West Manggarai is one of East Nusa Tenggara province's six poorest districts (Badan Pusat Statistik 2013). Less than half of the adult population in this region has a high school education, and the literacy rate is only 10%. Another indication of rural poverty is the lack of basic infrastructure for transportation, electricity, markets, education and health. The population is growing at a rate of 3.08% per year.

As the demand on Mbeliling's forests to support a variety of functions continues to grow, new opportunities are emerging to manage the forests as part of a productive landscape. The creation of a number of new institutions has resulted in new opportunities for

integrating environmental and socio-economic concerns, but they also bring to the forefront the ongoing challenges of landscape governance.

Governance in the landscape: meeting community needs

In 2007 an Indonesian NGO, Burung Indonesia,[2] began working with 27 villages in Mbeliling, focusing on natural resource management and livelihoods. They created village resource management agreements (VRMAs), which outline the principles, responsibilities and rights of stakeholders. The agreements were developed through a series of assessments and consultations involving the villagers and government representatives at village and district levels. The VRMAs contain the shared vision and principles of the communities regarding land use and livelihood development for each of the villages. To support the implementation of the VRMAs, local conservation and development groups (CDGs) were established in each of the villages to build capacity in conservation and livelihood development.

When the CDGs were first established they focused on conservation-related activities, such as monitoring of ecosystem services, preventing slash-and-burn agriculture, protecting water sources through tree planting, and monitoring of disturbances to forests, including the expansion of agricultural activities into the forest area. After nearly four years of implementation, the VRMAs have been important in stopping encroachment into forest areas. For the past three years there have been no new incidents of encroachment. Efforts to reduce slash-and-burn practices on private land, however, have had mixed results. The CDGs have sponsored training in good agroforestry practices, but this training alone has not been able to change traditional farming practices. The lack of much needed agricultural extension from the government has compounded the situation.

A critical element of the VRMAs is the livelihood development plan. The villages are anxious to obtain legal recognition to collect non-timber forest products (NTFPs) such as honey and rattan in the protection forests. One village has proposed a redrawing of forest boundaries that would involve the transfer of five ha of protection forest to the village communities. This request is still being negotiated. Meanwhile, to support agriculture and agroforestry activities, microfinance facilities were established in each village by channelling start-up funds to the CDGs and other community groups. This initiative has helped communities improve their agriculture production and cash income through activities such as planting vegetables and other seasonal crops as well as animal husbandry. Specialty coffee, which was previously sold as unprocessed beans, is now being processed as ground coffee and sold via a cooperative in order to bring a better price for the farmers. In addition, three of the villages surrounding Sano Nggoang Lake created the basic infrastructure for community-based ecotourism, such as home stays and nature trails to capture the growing tourist market that is looking for an alternative to mass tourism. These new business initiatives

are already improving family incomes: the average income of participating households has risen an average of 25%, well above the targeted 10% (Burung Indonesia 2014).

In 2008, representatives of the communities established the Mbeliling Community Forum (FPKM) in order to address issues that were common to all the villages, such as market access and government-sponsored development programmes. The FPKM created a cooperative for the joint marketing of agro-forest commodities with market potential, such as candlenut and coffee. Plans are underway to market the candlenut through a cooperative that will buy the nuts from the communities and members of CDGs. The cooperative will then sell the commodity to a wholesaler in Java for much better price than what the farmers currently receive from intermediaries.

The FPKM also brings the voices of local communities to various local government agencies to discuss development priorities. Putting village priorities on the agenda is difficult, even though a bottom-up planning process (known as *musrenbang*) is in place. The forum operates within a system that delivers programmes based on a budget set at the district level that does not often match local needs. As a result, community-led development programmes are low on the list of priorities.

This situation has begun to change, however, as the FPKM makes efforts to synchronize village development priorities with the district government's agenda. In addition, the FPKM is active in communicating village priorities to the relevant sector agencies in the district. The district government has involved the forum in annual development coordination discussions *(rakorbang)*, in preparing and communicating a draft district regulation *(ranperda)* on water resources management and customary forest management, and in developing a land-use management plan for a new tourist destination, Sano Nggoang Lake.

Given Mbeliling's importance as a source of water, the FPKM is promoting new ways of managing the resource to ensure its sustainability. The CDGs planted 24,495 tree saplings at 43 water sources in 16 villages as part of their commitment to protect the environment. They also planted 5,000 saplings at critical locations in the forest to safeguard the quality of the water catchment area. The FPKM is promoting payment for water services as a means to support community initiatives that protect water sources. Although the government has yet to agree to the payment scheme by issuing local regulations for water management, the idea has been agreed to by all the stakeholders.

The FPKM's membership is limited to the 27 villages; the Mbeliling Committee *(Komite Mbeliling)* is designed to engage all stakeholders in the Mbeliling landscape. Created in 2011, this multi-stakeholder forum brings together government representatives from various agencies and civil society organizations, including FPKM, to address landscape governance issues. The committee's call for better management of the protection forest and production forest received a positive response by the district head. Plans are now underway to establish a Forest Management Unit (FMU) in West Manggarai district supported by the district government.[3]

The Mbeliling Committee also facilitated stakeholder discussions during 2011–13 to prepare the Strategic Plan for Sustainable and Productive Management of Mbeliling Landscape (RS-BAM). The document recognizes the multi-functional nature of the Mbeliling landscape and highlights the importance of the landscape in protecting biodiversity, providing ecosystem services, and supporting community livelihoods. The document is in the final stages of consultations at the district level. Once it is endorsed the district government, the plan will assist district government agencies in planning across sectors. This will be an important first step in moving away from sectoral approaches to planning and management in the landscape.

Lessons learned

Landscape governance in the Mbeliling region is slowly evolving as a response to local realities. Forest management, livelihood and ecological concerns (particularly water management) are no longer seen as sectoral concerns; as an understanding of the multi-functional nature of the landscape takes hold they are being integrated.

The VRMAs provide a foundation for dealing with conservation and livelihood activities at the village level that were not being addressed by the village or district governments. They allow the communities to solve problems while creating capacity in participatory decision-making, forest management, livelihoods and negotiations with external parties.[4] Planning, capacity development and monitoring at the village level have been key in the development of a microfinance facility and the creation of new businesses.

As the communities gained experience they realized that they shared a number of common interests, such as a desire to improve their livelihoods. The CDGs are rooted in the villages and can be the basis of landscape governance with the FPKM. Since representatives of village governments, community leaders and the CDGs all participate, the FPKM represents the concerns of local communities across the entire landscape. This gives the forum leverage in dealing with the district government or other external parties. Through the Mbeliling Committee, the FPKM has become one of a number of stakeholders who interact with the district government. This is what Perrault (2005) refers to as "rescaling governance" (see also Cohen 2012).

New institutions have emerged as a response to the complexity of the area's socio-economic and environmental issues. The FPKM and the Mbeliling Committee are negotiating for a greater voice in determining how the landscape will be managed. The creation of the FMU has decentralized authority over the state-owned forests from the central to the district government. This indicates the highly dynamic nature of governance. The environment is not static; it is constantly changing, and so too will the array of forces that have a stake in the landscape (Robbins 2004). The FMU has the potential to dramatically improve forest management, since decisions will now be made at the district level. However, it will be a number of years before the FMU is fully operational; funding and implementation capacity are still lacking.

These fora work with the district government to address resource management and livelihood issues. The district government, however, must often respond to short-term political imperatives to deliver development programmes. This means that the types of programmes provided do not necessarily meet the needs at the village level. In addition, short-term thinking is not well suited to addressing ecosystem dynamics (Sneddon et al. 2002). This is a political reality that cannot be easily addressed. Another problem is the high turnover in government officials in the district and sub-district agencies. This means that local bodies have to develop the capacity and staying power to work in a highly dynamic political context.

The new institutions have opened the door to greater grassroots participation in the decision-making process. They offer the potential for groups who have traditionally been excluded to develop new skills and build alliances. This can be seen in the creation of the cooperative and the development of the management plan for the Mbeliling landscape. Ensuring that these forums are inclusive and equitable is an ongoing challenge; participation by women in decision-making positions in FPKM is still not equal to that of men (Burung Indonesia 2010). To paraphrase Barham (2001), the reassembling of authority at the landscape level may neglect democratic processes and further marginalize certain groups. In order to ensure that benefits are not captured by elites it will be important to monitor who has been empowered in this process and what socio-economic and ecological outcomes have been achieved.

The creation of institutions to address landscape-wide issues began with a focus on the needs of the 27 villages. An approach that combined both livelihood and conservation concerns has resulted in a number of successes, such as decreased encroachment, improved incomes, increased capacity and new institutions. New actors are participating in decision making at various levels, which bodes well for developing democratic institutions that are equitable and inclusive.

Nevertheless, there is still considerable work to be done, such as ongoing capacity development. Skills are needed in areas such as marketing, conflict resolution, environmental monitoring and financial management. At the same time, the broader policy environment still needs considerable attention in order to support productive landscape approaches.

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Endnotes

1. According to Ministry of Forestry Law 41/1999, a protection forest *(hutan lindung)* "... is an area with the principal function as a life support system for the protection of water, preventing floods, controlling erosion, preventing sea water intrusion, and maintaining soil fertility." In contrast, a protected area *(kawasan konservasi)* refers to national parks for the conservation of biodiversity. There are no protected areas in Mbeliling.
2. Burung Indonesia, or BirdLife Indonesia Association, is a national conservation NGO in Indonesia. It is a member of BirdLife International Global Partnership.
3. "A Forest Management Unit is an area of forest land managed to meet a series of objectives explicitly determined in a long-term management plan. The overall area of an FMU has clear boundaries demarcated both in the field and on the map. One or more forest functions (conservation, protected and production) can be included in an FMU, but the FMU will be classified by its dominant forest function" (MOF 2007: 7).
4. It is important to note that with the implementation of regional autonomy in 2000, formal government decision-making was decentralized to the district level. This created new opportunities for individuals or groups to organize and to play a role in local political processes.

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Section 4

Forests and trees in multi-functional landscapes

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4.1 Analog forestry: creating productive landscapes

ADAM KABIR DICKINSON

Introduction

One of the key challenges in the wake of the Green Revolution[1] is finding a way for agricultural landscapes to contribute to ecosystem integrity and safeguard biodiversity (Scherr and McNeely 2008). In order for restoration and sustainable land management to take hold in forested areas around the world, landscapes must be restored and managed in a way that provides connectivity and environmental services while also maintaining or improving the livelihoods of the people who inhabit those landscapes.

This article presents two experiences that provide specific steps to address these challenges. Productive landscapes can be created through inclusive, participatory networks, recognition of the diverse land uses that make up mosaic landscapes, and grassroots initiatives combined with regional coordination. These three aspects have distinguished the biological corridors in the Colinas Bajas Model Forest, Dominican Republic and in Nuevo Mundo, Ecuador. Initiatives there are further united by their focus on analog forestry as a method for achieving productive landscapes.

Analog forestry: a restoration tool for productive landscapes

Analog forestry (AF) is a landscape-level approach geared to productive landscapes (Box 1). It is applied at the local level with individual practitioners and community groups. AF's key goal is to establish a tree-dominated ecosystem that is analogous in structure and function to the native forests of the region (Senanayake and Jack 1998). When applied to agroforestry systems, AF places an emphasis on selecting species that are analogous in structure to species in a natural forest, but that also provide an economic benefit. For example, understorey trees may be replaced by crops such as coffee or cacao, while taller canopies might be "recreated" with trees that are valued for their timber or other products. A further focus of AF is following natural succession, combining crops with varying production schedules.

Analog forestry systems are ideal for small-scale agriculture or for single components in a diverse, larger-scale landscape.

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Annual crops may predominate at first, but they will gradually be replaced by longer-lived tree crops, so that the system develops into a mature, productive landscape that provides a diversity of products.

Box 1. Analog forestry and agroforestry

A common source of confusion when talking about AF is the difference between analog forestry and agroforestry. AF is an agroforestry technique that emphasizes maturity and biodiversity. In practice, AF systems often use ecological succession to establish, in stages, a mature and productive forest system. In the first stage, annual crops are grown alongside fast-growing shrubs and trees that yield crops, NTFPs and/or timber within a relatively short time frame. Longer-lived canopy trees and late successional species are gradually introduced as the system matures.

Analog forests differ from traditional agroforestry in their emphasis on mimicking native forest structure and their biodiversity. This increases their utility, both in diversity of production and in the ecosystem services they provide. They are also more useful in biological corridors, since their structure more closely approximates that of a natural forest and of the remnant forest patches that they seek to connect.

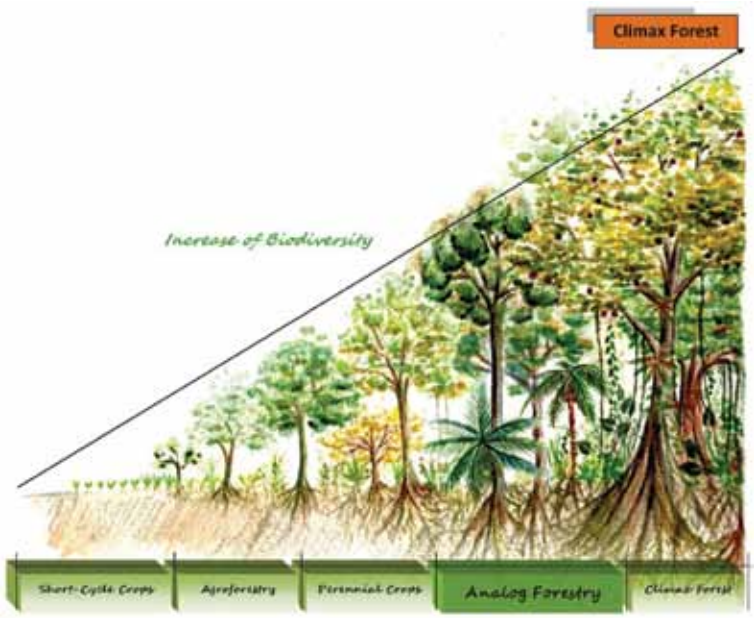
By creating an agroforestry system that mimics mature forest structure and function, analog forestry (Figure 1) provides three benefits:

- increased ecosystem services from a mature forest system;
- economic opportunities from the production of both timber and non-timber forest products (NTFPs); and
- social benefits stemming from community organization and the exchange of information, best practices and strategies among practitioners (woodlot managers, farmers and ranchers).

The detailed planning, design and implementation that go into analog forestry systems make it ideal for small-scale agriculture or as a single component of a diverse, larger-scale landscape. A diversified approach is often required, especially when AF involves a direct trade-off between income-generating activities, such as annual crops or livestock rearing, and a longer-term investment in biodiversity restoration and forest production. Analog forestry often forms a part of a larger landscape, alongside annual cultivation as well as perennial systems such as agroforestry and forest pastures.

In addition, the diversity of species and a dynamic information exchange system among practitioners distinguishes AF as a climate-smart solution for farmers and communities. AF systems are generally built around a long-term design, where species are chosen for short-, medium-, and long-term production time frames. The process of selecting which species will be used, when combined with local experience and projections of climate change impacts, allows farmers and communities to plan diverse agroforestry systems that address climate impacts.

Figure 1. Analog forestry



Colinas Bajas Model Forest

Towards a regional biological corridor

The Colinas Bajas Model Forest is located in the heart of the Dominican Republic's western Cibao Region. It is part of the Iberoamerican Model Forest Network, a regional group of local networks of Model Forests. The Model Forest platform consists of a network of stakeholders with interests pertaining to large-scale, forest-based landscapes. The platform allows these actors to engage in dialogue on issues of common concern and plan joint projects. The model platform governance network includes local communities, indigenous groups, forest-based companies and local and regional governments. The Model Forest concept has been applied in forested landscapes in Canada, Europe and Asia as well as Latin America (see article 2.2).

The Colinas Bajas Model Forest was formed in 2011, making it the newest of the country's three Model Forests. It brings together diverse actors from western Cibao, including government, academic institutions, farmers' and ranchers' groups, and small, medium and large forest enterprises. These groups interact with one another and make joint decisions on issues that affect the forest landscape. The governance body is coordinated by the NGO Enda-Dominicana (Enda-dom) and the *Universidad Católica Nordestana*.

Since 2012, Enda-dom, in collaboration with other Model Forest actors, has executed an ambitious project to create a biological corridor that increases continuous forest cover between the Pueblo Viejo gold mine near Cotuí, Sánchez Ramírez Province, and Los Haitises National Park on the country's eastern coast (Checo 2010). This initiative is funded by Barrick Gold, which operates the Pueblo Viejo mine, as part of its restoration

strategy for the region surrounding the mine. It is also part of the company's community relations initiatives, which aim to create sustainable income-generating activities in the region.

The project's goal of expanding forest cover through the agricultural lands of the western Cibao Region has mostly taken the form of supporting the development of AF systems. These efforts build on Enda-dom's long history of involvement in this area; the NGO has worked on analog forestry systems with farmers' groups in the area for 30 years. This has made the prospect of changing production systems less daunting to the region's farmers, since there are several well-established analog forestry systems in the area. They are frequently visited by communities that are establishing their own AF projects.

In addition to privately held smallholder agriculture, forestry plantations belonging to medium- and large-scale landowners and pasture are important land-use activities in the Cibao Region. Indeed, a landscape-level approach that did not take all of these land uses into account would be extremely limited in its potential. There are fewer woodlots and pastures than smallholdings, although their average area is far greater, and they represent an important portion of the landscape. The issue of land tenure is sometimes a thorny one when working with smallholder agricultural lands and community-managed hinterland and the land's owner is not always known. The project has been assisted in this regard by the Dominican Agricultural Institute, a government body charged with resolving land tenure disputes.

Enda-dom has had success working with forest enterprises in the management of their woodlots, specifically in helping to formulate management plans. In the Dominican Republic this can be an onerous task that is often weighed down by bureaucracy. Programmes are underway to work with ranchers' groups to develop forest pasture systems. Although it is unlikely that the managed woodlots or forest pasture systems will reach similar levels of productivity or biodiversity to the analog forestry parcels, their function of increasing forest cover and maintaining connectivity within the biological corridor makes them indispensable landscape elements (Laurance 2004).

Coordination with woodlot owners and ranchers has been difficult at times. These groups sometimes mistrust environmental initiatives, especially in the context of the Dominican Republic, where forest protection laws have been strict, even punitive, towards forest businesses. The Model Forest platform has been invaluable in these efforts in terms of calling these groups together. Enda-dom's task has often been to facilitate communication between private-sector interests and the government bureaucracy, as it did in aiding in the development of management plans for forest enterprises. Agroforestry, forest pastures and analog forestry provide technical toolkits that help to facilitate the adoption of sustainable practices by these groups by providing operational guidelines.

Nuevo Mundo

A new world is possible

The settlement of Nuevo Mundo, in the northwest of Ecuador's Pinchincha Province, is a relatively new settlement, populated most recently by migrants from Loja Province in southern Ecuador in the 1960s and '70s. The first settlers produced primarily coffee, but by the 1990s the dominant economic activity in the area was cattle herding and milk production. This came about as a result of the widespread clearance of the land in the wake of government incentives that assigned land tenure to those who had "worked" (i.e., in many cases, cleared) the land.

As of 1998, the community began a working relationship with a Quito-based NGO, Fundación Rainforest Rescue (FURARE), which coordinated the analog forestry projects within the area. Analog forestry began in the area as a way to reclaim some of the land that had been cleared for pasture — which was becoming less and less productive — with a focus on fruit production for community nutrition (Gamboa et al. 2010).

As time went on, producers along the town's two rivers, the Río Macas and the Río Nuevo Mundo, decided to create a continuous biological corridor in order to safeguard the town's water supply, which was increasingly prone to droughts and floods. A number of land uses prevailed, including more mature analog forestry parcels, incipient agroforestry zones, and forest pastures in grazing zones. Given the general decline observed in local pastures throughout the 1990s, one of the key practices adopted with AF was forest pastures, which allowed producers to maintain their cattle herds without clearing new land.

One of the important results of the Nuevo Mundo project was capacity building. By the time project activities ended, almost all community members had received some training in land management, the application of analog forestry, care of orchids, guiding and birding, and other skills. Since the activities related with the biological corridor ceased, neighbouring communities have learned from the experiences of the inhabitants of Nuevo Mundo and replicated their practices to a limited degree.

Lessons learned: mosaic landscapes and grassroots approaches

Analog forests in mosaic landscapes

Analog forests are a key component of mosaic landscapes. The goal is for forests to be valued by individual land-owners, communities and regional associations for a range of uses. Analog forestry forms part of a landscape that includes diverse land uses, including pasture, annual cultivation, agroforestry, forest pasture, plantations and natural forests. Analog forestry is a key part of the landscape due to the increased ecosystem services, forest products, and the linkages between natural forest areas that it provides. Analog forestry benefits from a landscape approach that emphasizes various methods to increase

forest cover, including forest pastures and agroforestry, since this helps to create a connected landscape with fewer ecologically vulnerable areas.

The importance of bottom-up participation

Because of the high degree of planning and design required to establish large-scale analog forestry projects, it is necessary to ensure that there is broad participation from the community. This includes farmers' associations and any other groups that are involved in land tenure, such as ranchers, foresters and government agencies. A regional platform for inter-sectoral dialogue — such as the Model Forest — is highly useful, as it helps diverse groups come to a common understanding on land use and policy.

It is important for facilitating groups, such as Enda-dom in the Dominican Republic and FURARE in Ecuador, to demonstrate value to key stakeholders so that they have a clear incentive to participate. In the case of FURARE, this took the form of providing a community nursery and various capacity-building workshops. Enda-dom, operating on a wider scale, has facilitated relationships between private-sector groups, community associations, and local and regional governments.

Capacity building is an important component of analog forestry plans, which often involve significant changes in local livelihoods related to production, consumption and transport. The creation of local capacity is one of the most important factors for replicating the experience in neighbouring areas; it empowers practitioners to share their knowledge and experiences with others who are willing to learn.

A final requirement is the documentation and sharing of experiences. Both FURARE and Enda-dom, as organizations who practise and promote analog forestry, belong to the International Analog Forestry Network, which is dedicated to knowledge sharing and capacity building among practitioners of analog forestry. This allows the lessons learned in distinct locations to be applied, where possible, to new locations and initiatives.

For more information

The International Analog Forestry Network's web site (www.analogforestry.org) has extensive documentation of analog forestry projects, including those mentioned here. Specific inquiries can be directed to Adam Kabir Dickinson. Enda-Dominicana can be found at http://endadom.wordpress.com, and is searching for individuals with relevant research interests to aid in their monitoring and evaluation efforts, with logistical support available for visiting researchers. Mamerto Valerio, Executive Director of Enda-dom, can be reached at direccion@endadom.org.do. There is no link to the Nuevo Mundo project, but inquiries can be directed to project leads Lorena Gamboa (lorenagamboa8@gmail.com) and David Torres (jdtorresg@yahoo.com). More information about Model Forests can be found at www.bosquesmodelo.net and www.imfn.net.

Endnote

1. The Green Revolution refers to research, development and technology efforts that took place from the 1940s to the late 1960s to increase agricultural production, especially in the developing world (www.wikipedia.com).

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4.2 The New Generation Plantations platform

LUIS NEVES SILVA

Introduction

The World Wide Fund for Nature's (WWF's) Living Forest Report (Taylor 2011) suggests that wood consumption — for pulp and paper, furniture and construction, biomass for energy, and other uses — is likely to triple over the next three decades. Since high-yield plantations use less land to produce fibre and fuel than natural forests, they have the potential to supply a large proportion of this increasing demand. This can help prevent the loss of natural forests and other important ecosystems. This assumes, of course, that plantations are expanded without conversion of natural forests or other ecosystems with high conservation value, such as critical shrubland or grassland.

Well-planned and well-managed plantations can help maintain the most valuable ecosystems while contributing to economic development and employment. Unfortunately, bad plantation practices still exist in some regions. These are rightly criticized by civil society, including WWF. There are also legitimate concerns around issues such as land tenure, labour, water use and intensification.

A landscape approach involves thinking, planning and actions that go beyond individual sites and interests.

The New Generation Plantations (NGP) platform brings together WWF, plantation-related companies and government agencies to co-develop sustainable solutions for plantation management. The conviction is that forest plantations should contribute positively to the welfare of local communities. They should not replace natural forests, other ecosystems of high conservation value, or agricultural land that is important for food security.

The ideal plantation would bring environmental benefits and would improve the lives of people in the landscapes where it is located. It would maintain ecosystem integrity and be developed through effective stakeholder participation.

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The NGP approach is based on transparency, cooperation across sectors, mutual learning and co-construction of solutions to shared problems, and continuous improvement. A range of views can be expressed in a spirit of trust and respect. Sharing knowledge, experience, dialogue and insights allows participants to better understand environmentally sound, socially responsible and economically viable planning and management practices. This will help to avoid the risks and optimize the value of plantations.

NGP aims to identify and promote better practices around environmental issues such as carbon storage and maintenance of water, biodiversity and soils, as well as social issues including land rights, empowering local communities and sharing the benefits of plantations. It also promotes policies, legal controls and financial models to encourage better plantations.

The NGP platform is rooted in the field experience of its participants. Better plantation practices are based on learning from real-world examples, including study tours to key regions, site visits and practical case studies.

Plantations and restoration: the NGP landscape approach

Maintaining ecosystem integrity and avoiding environmental degradation are key elements of the NGP landscape approach. Even the best-managed plantations tend to be industrial-scale monocrops, usually of non-native species, and cannot match the benefits of natural forests. However, the NGP model suggests that plantations can be a part of healthy, productive landscapes, while contributing to poverty reduction and sustainable development.

The landscape — both socio-economic and ecological — is the broader context within which plantation forestry operates. Managing and restoring ecosystem integrity and ecosystem services is a big part of this context, with all the benefits that this brings for the environment, human well-being and the economy.

The environmental problems related to plantation forestry are largely known, and there are well-developed tools to address them. Under the NGP approach, for example, participants' management plans will include measures to prevent the spread of invasive alien plant species, avoid planting in freshwater ecosystems such as wetlands and riparian zones, and protect and enhance areas of high conservation value. With the tools available for assessing, avoiding, mitigating and offsetting environmental impacts, there should be little reason for plantation forestry to cause ecosystem degradation.

In fact, responsible plantations can help restore degraded landscapes and can enhance areas of ecological sensitivity or high conservation value. The following three NGP case studies show how plantations are making a positive contribution to landscapes. In each case, restoration also brings benefits for local people; for example, through employment and business opportunities, enhanced ecosystem services, and preservation of important cultural values.

Case study: Brazil

Veracel Celulose, a joint venture between two private companies, is a pulp mill and tree plantation in the south of Bahia State, Brazil. When its predecessor, Veracruz Florestal, planted its first trees in 1993, less than 7% of the original Atlantic rainforest *(Mata Atlântica)* remained. During the 1960s and '70s, the logging of valuable tree species and subsequent clearing of the land for cattle grazing had rapidly destroyed the area's forests. When Veracel started operations in southern Bahia the landscape was dominated by pastureland converted from the Atlantic rainforest. The land had been so heavily modified and degraded that in many areas the original vegetation could no longer regenerate naturally.

More than 97% of Veracel's tree plantations are on land that had previously been used for cattle grazing; the remainder was mostly used for growing papaya or was already planted with eucalyptus. Veracel carries out detailed studies before acquiring any properties and has committed not to convert natural forest or protected areas to plantations. When establishing new plantations, the company always studies aerial photographs or satellite images to ensure that no Atlantic rainforest has been felled there since 1994. Veracel determines whether the property in question is being officially evaluated as a future conservation area. The company also applies a number of social conditions: it excludes land claimed by indigenous peoples (there are 17 tribes living within Veracel's area of operation, but only seven reserves have official legal recognition) and areas assigned for land reform.

Veracel owns approximately 210,000 hectares (ha) in the south of Bahia. It has planted close to 92,400 ha with eucalyptus; more than 100,000 ha is set aside for conservation. These areas mainly regenerate naturally, but the most degraded land is restored through the planting of native Atlantic rainforest species. Analyses of satellite and aerial image show that there is more rainforest in the area now than when the first trees were planted in 1993.

Every year Veracel replants approximately 400 ha with native tree species. By the end of 2012, it had restored more than 4,700 ha of Atlantic rainforest. Veracel also works to protect remnants of the natural forest and connect them through forest corridors. These activities are aligned with local priorities and with national conservation initiatives to protect the main rainforest corridors in Brazil. For example, two reserves belonging to the indigenous Pataxó people have been connected to a 6,000-ha remnant of Atlantic rainforest, and animals such as tapirs and peccaries are returning.

Veracel supports income generation by teaching local people how to use native plants and forest resources in a sustainable manner. This takes pressure off the remnants of the native forest, where the local people would otherwise obtain wood. Veracel also sources wood from more than 100 local small-scale growers, who are given support to restore native vegetation on their own land and encouraged to combine trees with other crops and livestock. Such initiatives help communities by building their capacity to run their own ecologically sustainable businesses.

In 2011, 26,000 ha of land earmarked for plantations were occupied by social movements such as the Landless Workers Movement. The company actively engaged with these groups, with mediation by the Bahia state government, to reach a mutually acceptable compromise. Around 10,000 ha of Veracel's land is being purchased by the National Institute for Colonization and Agrarian Reform, and the company will help the settled communities make the best possible use of these areas.

Case study: Uruguay

Around 85% of land in Uruguay is used for agriculture, mostly cattle ranching. Intensive grazing and deforestation has destroyed much of the palm savannah that once covered Uruguay, the south of Brazil and northeast Argentina. Today, only isolated fragments remain. Conserving native tree species such as the majestic yatay palm *(Butia yatay)* is a national priority and is crucial in maintaining biological diversity and ecological integrity.

UPM Forestal Oriental owns around 200,000 ha of former agriculture land in Uruguay. In December 2009, UPM commissioned a local expert to prepare management recommendations for the yatay palm, a protected species endemic to the Uruguay savannah ecoregion. The tree produces fruit that local people use to make jams and drinks; the fruit is also food for numerous mammal, bird and insect species.

The palm trees are threatened by agriculture practices such as grazing, cultivation and use of herbicides. Young palms are eaten by grazing animals, destroyed by weed killers or ploughed up, making it unable to regenerate. UPM's forest plantations allow the plants a chance to grow: herbicide is applied only once per ten-year rotation; the soil is less disturbed; and less grazing is allowed.

UPM's study covered a large area (about 10,000 ha) that had been planted ten years previously, and where palm populations were increasing. The study resulted in a palm conservation programme that aims to help this native tree species and valuable habitat to regenerate. The plantation design includes biological corridors to connect isolated patches of palms. Palm trees are preserved within the conservation areas that make up around one-third of UPM's property. Mature palms are preserved within the plantation areas. With the approval of the Uruguayan government, young palms are transplanted to other areas where possible.

As well as helping to preserve and restore the integrity of the palm savannah ecosystem, palm tree conservation can create economic opportunities for local people. Possible business developments include selling palm seedlings for landscaping, and commercializing the traditional liqueur made from the fruits of the yatay palm.

Case study: South Africa

Water is one of South Africa's scarcest natural resources. The country's wetlands are hugely important for the environment and people, including around six million South Africans who do not have access to safe drinking water. More than half of South Africa's wetlands have been significantly damaged by agriculture and other development initiatives, including commercial forestry plantations.

NGP participant Mondi has taken the lead in mapping, protecting and rehabilitating wetlands such as Lake St. Lucia in iSimangaliso Wetland Park, the country's last remaining coastal wilderness and a World Heritage Site. Mondi took over the extensive pine plantations on the western shores of the lake in 2004, when South Africa privatized its state forests. To manage them, it formed SiyaQhubeka Forests (SQF), in partnership with black economic empowerment organizations, the government and local communities.

Some poorly sited plantations were having a negative impact on the lake and its wildlife by reducing freshwater flows. Water levels were too low and salinity levels too high, especially in the dry season.

Mondi-SQF worked with the government, environmental NGOs and the park authority to determine which areas were suitable for commercial plantations, and which should be returned to their natural state. They mapped out a 120-km "eco-boundary" to divide wetland areas and other important ecosystem components from the dry mineral soils best suited to plantations, where negative impacts would be minimal.

As a result, 9,000 ha of plantations with significant potential conservation value were transferred to the iSimangaliso Wetland Park. The trees were removed, and the land was restored to wetlands and savannah. A further 14,200 ha of SQF's land — including plantations and areas of natural forest and wetlands — was later incorporated into the park.

Today, both SQF and the park are thriving. Regular freshwater flows into Lake St. Lucia have been secured, and the rehabilitated wetlands and grasslands already support a wide range of biodiversity. As well as benefiting Lake St. Lucia's many birds and freshwater species, the project has extended the habitat of the park's large animals, including elephants, rhinoceros, giraffes and cheetahs. Herds of buffalo, zebras and antelopes graze in the firebreaks and corridors between the trees. The plantations also provide an important buffer, protecting the wilderness area from encroaching development.

Mondi works in close partnership with local communities through SQF, and has transferred some of its plantation land to community ownership as part of a pioneering model of land restitution.

Conclusions

A landscape approach provides the concept and tools for planning and managing a range of land uses and balancing social, environmental and economic objectives. It involves thinking, planning and actions that go beyond individual sites and interests to the broader context, where people share and shape the socio-economic, governance and ecological components of their land. Landscapes can incorporate not just physical or ecological boundaries (often a catchment or sub-catchment), but also social, governance and economic elements.

There are often multiple drivers of ecosystem change in the areas where plantations operate, often with social causes. These can seriously undermine ecosystem functioning. Plantation expansion in degraded landscapes — if well managed — can help to rehabilitate forest areas and ecosystem functioning. This will benefit the socio-ecological landscape.

The NGP landscape approach constructs effective partnerships between the forest sector and society. This is a big challenge, since there have undeniably been conflicts in the past. But there is the potential to use the process to improve local governance and create mutually beneficial partnerships with government, communities, NGOs and other land users.

Sustainability is a journey, not a fixed destination. NGP is an evolving process of self-discovery and collaborative, practical learning. It is based on transparency, cooperation across sectors, mutual learning and co-construction of solutions to shared problems. NGP participants lead by example in disclosing information about their current plantation practices. They also show what steps they are taking to put their commitments into practice and share first-hand experiences about effective plantation management methods. Through regular study tours, participants have visited all NGP's projects, including those mentioned here, taking the lessons learned in these landscapes back to their own communities.

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4.3 Participatory forest management in the Caribbean

NICOLE LEOTAUD and CLAUS ECKELMANN

Introduction

The islands of the Caribbean were originally settled by Amerindian and Carib tribes from South America and colonized by European settlers since the 15th century. These settlers imported slaves from Africa to work on sugar and other agricultural plantations. The traditional economic base of the islands was agriculture and the export of agricultural commodities; sugar and bananas were the main source of revenue. Today, tourism has replaced agriculture as the mainstay of the islands' economies. The importance of agriculture has severely declined and nowadays all Caribbean countries import between 70% and 90% of their food.

Most of the islands are densely populated, with 200–300 people per km^2. Because of this high population pressure most lands suitable for crop production have been cleared of their original forest cover. Forest remained only where lands were inaccessible or too steep to be cultivated. With the general decline of agriculture in the islands, former agricultural fields are being naturally recolonized by secondary forest, a process called "voluntary reforestation." Much of this natural reforestation happens with introduced species such as *Leucaena leucocephala*.[1] Forest cover in the Caribbean islands currently ranges from one-third to two-thirds of land area and is slowly increasing in many islands, despite the ongoing clearing of forested lands for housing, commercial and industrial development and for roads and other infrastructure.

A Participatory approach is a process, not a project.

In addition to their traditional role as a land reserve for agriculture, the Caribbean's forests provided timber, firewood and non-timber forest products (NTFPs) such as vines and grasses for basket weaving, and medicinal herbs. The most important commodity provided by the forest is water. In the volcanic islands of the Caribbean, all potable water is tapped from springs and streams in the mountainous forests in the interior of the islands.

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Participatory forest management

A landscape approach to forest management requires the full range of stakeholders to be involved in managing land areas and using forest and other resources. Participatory forest management approaches engage all stakeholders in making decisions about how forest resources are managed and are therefore fundamental to a landscape approach.

Most of the remaining forest is located in the upper watersheds. In the English-speaking Caribbean islands these forests are generally owned by the government and managed by the state forest administration. Administrators manage these resources by issuing licences for the removal of timber, NTFPs and hunting, and by policing the forest estate to ensure that resource users comply with regulations.

This does not always ensure the protection and conservation of the forest resources. There are many examples of forest degradation (due, for example, to illegal logging, fires, invasive species and fragmentation caused by roads) and deforestation (due, for example, to clearing for housing and other developments as well as illegal agriculture and settlements).

Several countries began to restore degraded forests through government-funded reforestation programmes, but the process was expensive and many governments did not consider it important enough to invest a large amount of money. These reforestation programmes did, however, engage local communities and trigger the development of joint initiatives between forest users and forest administrators (Box 1).

Box 1. Examples of joint initiatives

The Taungya system, practised in Trinidad in the first half of the 20th century, provided degraded forest areas to landless farmers for agricultural crops. The farmer was asked to plant and care for the seedlings of timber trees. Once the timber trees grew taller and the production of agricultural crops was no longer feasible, the farmer was given a new parcel of depleted forest land to reforest.

Another successful example of co-management was the Shelterwood system practised in Trinidad's Arena forest reserve. The reserve had been completely depleted of its useful timber resources by the 1930s. Forest administrators decided to restore the forest's productive capacity through clear felling (where most or all of the trees are cut down) and reforestation. Although clear felling and artificial reforestation were not successful, natural regeneration was observed in the shelter of the remaining trees. This observation was the key to a natural regeneration programme. People who burned charcoal were given the right to convert certain trees to charcoal; the trees would be removed in order to create a shelter of seed trees that naturally regenerated the forest with a diverse mix of tree species. This system was successfully practised in Trinidad until oil and gas replaced charcoal as the main household fuel for cooking.

The Taungya system and the Trinidad Shelterwood system are examples of forest restoration practices — at the landscape level — that involve co-management agreements. Both systems were based on the benefits received by the participants. Landless farmers were provided with access to land; charcoal burners had the right to fell trees and burn charcoal in order to make a living. The forest administrators benefitted from the planting and tending of timber seedlings and the establishment of a natural regeneration process to restore a degraded forest. Cooperation continued as long as both partners had a continued interest in the benefits offered.

In recent decades, forest administrators have realized that managing and protecting forests through user licences and policing alone is not feasible. This created opportunities for alternative practices. Based on experiences with selected initiatives across the islands,[2] the idea of co-management or participatory forest management (PFM) is now generally accepted. However, there is a gap between general acceptance and practice. PFM requires specific capacities for both forest user groups and forest administrations, which need to be developed over time.

Capacities of resource users

Any user group interested in providing a forest product or service needs the technical capacity to do so. These services include the production of chainsaw lumber, the burning of charcoal, harvesting and processing of NTFPs, and guide services for ecotourism.

In addition to technical knowledge of production processes, group members need to be able to develop and manage their business and to meet the diverse expectations of individual members. Members are likely to support the group as a whole only if they feel that it reflects their individual interests. Successful self-governance is essential to the group's decision-making and sustainability. Unity within the group is necessary in order to articulate and communicate its interests. This is important when negotiating specific access rights to forest resources or advocating for participatory approaches to forest management in a policy formulation process.

People are more willing to invest time and resources in a co-management arrangement if they receive benefits from it. Although there are altruistic forest user groups such as conservation NGOs, who advocate for the conservation of forest resources, the majority of forest user groups have an interest in the forest as it directly supports their livelihoods. This includes income earned by community tour guides, charcoal burners and craft producers.

Capacities of state forest administrators

State forest administrators need the technical capacity to guide and support the economic activities of forest user groups. To be able to issue wood-cutting licences forest administrations need to know where the trees are and how many can be sustainably harvested.

Forest administrators also need to have social skills. This requires a willingness to listen and to meaningfully consult and dialogue with forest user groups.

Another important area of capacity is the enabling policy and institutional structure. Very few forest policies explicitly include PFM. (The 2011 National Forest Policy of Trinidad and Tobago is an exception; it explicitly mentions participatory management as a guiding concept for decision-making in forest management.) There are even fewer forest laws and forest regulations on formal co-management arrangements, although the 1996 *Forest Act* of Jamaica provides for the creation of Local Forest Management Committees at the local level of municipalities or watersheds. Where policies and laws do enable PFM, forest administrators need to create structures and processes to implement policies.

More important than the legal foundation is the creation of trust among the various actors. Trust cannot be ordered by laws and regulations. It grows over time and is nourished by a culture of dialogue and joint reflection on the results achieved and the lessons learned.

Forestry authorities must continuously and actively engage with the people living in and around the forest to successfully facilitate PFM. This is often easier said than done. Many forest administrators believe that they are the sole custodians of the forest and that only they are responsible for managing the forest. Although well intended, most administrators lack the resources to singlehandedly manage the country's forest resources.

Increasingly, participatory approaches are reflected in the day-to-day work of forest administrations, even if they are not supported by a legal framework. For example, the Forestry Department of Jamaica employs two rural sociologists, and most forest administrations in the Caribbean have a community forestry unit or programme. In some cases informal arrangements with forest user groups have been useful even in the absence of an enabling policy environment. For example, the Fondes Amandes Reforestation Project in Trinidad reforested state lands for many years with the unstated approval of the government. The government recognized the value of the work being done to improve watershed services even before it finally granted formal permission to the project.

Partnership to build capacities for participatory forest management

Despite the general acceptance and wide support for PFM much remains to be done. Over the last decade the Caribbean Natural Resources Institute (CANARI)[3] and the United Nations Food and Agricultural Organization (FAO) have successfully partnered to develop capacity for PFM across the English-speaking Caribbean. Capacity-building initiatives have addressed several needs:

- strengthening policy frameworks;
- building capacity in facilitating participatory processes;
- analyzing lessons from community forestry initiatives;
- developing and piloting tools to facilitate PFM;
- conducting awareness and engagement campaigns; and
- supporting the development of sustainable forest-based community enterprises.

Strengthening policy frameworks

With financial assistance from FAO's National Forest Programme Facility, CANARI supported forest stakeholders (forest administrations, communities and civil society) in seven Caribbean countries to build their capacity to participate meaningfully in the national forest policy dialogue through a range of regional and national workshops and other initiatives.[4] CANARI also provided direct technical assistance to the Governments of Dominica[5] and Trinidad and Tobago[6] to develop new national forest policies.

Building capacity in facilitating participatory processes

To facilitate PFM, forest administrators need the capacity to document and draw lessons from practical examples of co-management in their countries. Under the Forest Law Enforcement, Governance and Trade Support Programme for African, Caribbean and Pacific Countries (EU-ACP FLEGT), CANARI trained forestry officials to mentor community forestry groups. Mentoring provides support and guidance to community groups to help them identify and achieve their goals. Guidelines were developed on documenting participatory practices and mentoring community forest initiatives,[7] as was a regional synthesis of case studies of successful community forestry.[8]

Analyzing lessons from community forestry initiatives

In 2010 the Caribbean Subgroup of the Latin American and Caribbean Forestry Commission recommended that a Caribbean knowledge exchange initiative on community forestry be conducted. FAO, with financial support from the National Forest Programme (NFP) facility, supported this through an initiative to document case studies from 14 Caribbean countries. The case studies summarized Caribbean experiences with community forestry, analyzed the factors contributing to the success and problems of community forestry initiatives and presented recommendations on how to design successful programmes. A regional synthesis report was prepared.[9] Additional work using social media and video to engage communities in documenting and evaluating their experiences continues.[10]

Tools for participatory forest management

New planning tools were developed to analyze the needs of resource users and assess available resources. Participatory mapping and video were used for community forest management planning in Brasso Seco in Trinidad.[11] Participatory three-dimensional

modelling was used to assess climate change vulnerability for the island of Tobago.[12] CANARI is using these and other innovative tools to facilitate participatory natural resource management[13] in other PFM initiatives across the Caribbean.

Awareness and engagement

To help forest user groups successfully articulate their interests, CANARI, together with the Forestry Department in St. Vincent, used a community caravan and developed a radio drama series and other communication products.[14] CANARI is expanding its use of communication tools such as video and social media to reach diverse target audiences.

Community enterprises

Although forest user groups have business ideas, many of these never materialize because the groups lack the skills to prepare business plans. With support from FAO, CANARI selected three community forestry initiatives in Trinidad and Tobago, Jamaica and St. Vincent and assisted them in preparing business plans. The plans analyzed the feasibility of the proposed endeavour and detailed the resources and procedures needed to start the business.[15] This links to similar efforts across the Caribbean under CANARI's Rural Livelihoods programme.[16]

Community forestry cases in the Caribbean

According to a 2012 regional analysis of cases,[17] and to other work by CANARI, there is a range of PFM initiatives in the Caribbean. In many cases the state forest administration is working with a single community organization. These initiatives aim for forest conservation as well as livelihood benefits for the local community. Activities include watershed rehabilitation, NTFP marketing, sustainable forest management for timber production, sustainable agriculture/agroforestry, ecotourism and plantation timber production.

A range of PFM structures, involving various types of community participation, is possible:

- Initiatives can be catalyzed and driven by a government agency. For example, local watershed rehabilitation groups in Trinidad and Tobago were formed and operate under a government programme that pays local community members to conduct reforestation, which is overseen by government personnel.
- The relationship can be collaborative, with community input on management decisions. In Jamaica, Local Forest Management Committees are set up by the government under national legislation and are supported by rural sociologists and forest officers. The community groups develop their own plans and projects for reforestation, education and sustainable livelihoods.
- In some cases the community drives the relationship. The Fondes Amandes Reforestation Project in Trinidad is an example of a community reforesting a

watershed on its own initiative. The community brought government and other partners into the initiative, but led the agenda and determined the actions.

PFM initiatives provide a range of livelihood benefits, including human (e.g., development of technical skills and knowledge), social (e.g., strengthened community organizations and networks), financial (e.g., increased community income, jobs), physical (e.g., building of community facilities), natural (e.g., watershed rehabilitation), and political (e.g., enhanced community voice, changed government policy and practice).

Five key factors contributed to the success of community forestry in the Caribbean:

- strong community organizations with committed leaders and social ties in the community;
- open communication and two-way dialogue between government and resource users with transparency and accountability, which generated trust of government and a sense of ownership on the part of communities;
- tangible shared livelihood benefits for communities;
- long-term secure support to allow governance arrangements to evolve as relationships are built; and
- supportive policies and flexible implementation to respond to evolving contexts.

Ongoing efforts

Community forestry initiatives are taking place independently of each other in the Caribbean. Practice and policy are evolving as initiatives are implemented and lessons are learned. There is learning both within and across countries as state forest administrations and community organizations are brought together in regional processes, often convened by CANARI and FAO.[18] Forest administrators across the region share experiences and lessons on how community forestry can be effective and can deliver enhanced conservation and livelihood benefits. Gradually, national forestry programmes, policies and legislation are making provisions for PFM approaches. In Trinidad and Tobago, for example, after several years of collaboration on community-driven initiatives alongside government-driven programmes, the 2011 National Forest Policy[19] explicitly promotes participatory management with local communities and user groups.

Conclusions

A participatory approach to forest management and landscape restoration cannot be achieved in a project; it is a process. It starts with consultation and evolves over time towards the delegation of management authority. The speed of the process is based on the willingness and capacity of the stakeholders and the ability of existing policy and institutions to evolve to facilitate participatory arrangements. Willingness depends largely on mutual trust between the stakeholders to share and accept management responsibilities and work together for mutual benefits. The capacity to practise participatory management needs to be built in

both government agencies and resource user groups. Informal and formal agreements can evolve over time as trust and capacity are built.

CANARI and FAO remain committed to support these processes in the Caribbean islands. Both organizations believe that the successful management of forest resources — using a landscape approach — is possible only through the effective and equitable participation of the various stakeholders. Participatory approaches bring together all stakeholders to negotiate consensus on how to sustainably use forest resources and how to minimize negative impacts on the forest from other activities in the landscape. The dialogue, negotiation, coordination and collaboration involved in participatory approaches are essential in landscape management to ensure that forest resources are conserved and that well-being, economic and livelihood benefits are optimized.

Endnotes

1. *Leucaena leucocephala* is a small, fast-growing mimosoid tree. It is used for a variety of purposes, such as firewood, fibre and livestock fodder (http://en.wikipedia.org/wiki/Leucaena_leucocephala).
2. For example, see www.canari.org/forests.asp.
3. CANARI is a regional non-profit technical institute based in Trinidad. See www.canari.org.
4. See www.canari.org/forestmanagement.asp.
5. See www.canari.org/ta_rp4.asp.
6. See www.canari.org/fl_ta_2.asp.
7. See www.canari.org/documents/CMGuidelines7english.pdf.
8. See www.canari.org/documents/CaribCBFRegionalSynthesisfinal_2_.pdf.
9. See www.canari.org/documents/CaribCBFRegionalSynthesisfinal_2_.pdf.
10. For example, see www.canari.org/forest_cb.asp and www.canari.org/forestsustain.asp.
11. See www.canari.org/forestsustain.asp.
12. See www.canari.org/ccddr4.asp.
13. See www.canari.org/documents/CANARIPNRMTooklitFinalJan2012_003.pdf.
14. See www.canari.org/testingcommproducts.asp.
15. See www.canari.org/forest_fieldtest.asp.
16. See www.canari.org/rurallivelihood.asp.
17. See www.canari.org/documents/CaribCBFRegionalSynthesisfinal_2_.pdf.
18. For example, see www.canari.org/forestmanagement.asp.
19. See www.biodiversity.gov.tt/home/legislative-framework/policies/national-forest-policy-2011.html.

4.4 Returning pasture and cropland to forest in Brazil

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Introduction

The area covered by natural forests is decreasing in most parts of the world through conversion to pastureland and cropland. In Brazil, most natural forests do not produce sufficient economic returns to motivate rural producers to keep them natural. Although a forest plantation will generally support fewer native species than a natural forest, plantations — which are increasingly replacing degraded pastureland — often support a greater diversity of native species than pastureland does, particularly understorey species. Thus, forest plantations can help conserve or even restore biodiversity in production landscapes (Carnus et al. 2003).

Forest plantations can help conserve or even restore biodiversity in production landscapes.

An example is Brazil's Mato Grosso do Sul State Plan for the Sustainable Development of Planted Forests (*Plano Estadual para o Desenvolvimento Sustentável de Florestas Plantadas de Mato Grosso do Sul*, or PEF/MS). The forests planted through this programme are rehabilitating land that was degraded by cattle-ranching. They provide environmental services and forest products, and generate jobs and income in rural areas. Government involvement needs to be better coordinated, however, in order to increase social and environmental benefits.

Managing natural forests

Biological factors

Forests are an important part of mosaic landscapes. Forests (natural and plantations) provide multiple services, including nutrient cycling, climate regulation, erosion control, waste treatment, genetic resources, soil formation, water supply, moderation of extreme events, water regulation, biological control, culture, recreation and products such as wood, food, resins and oils.

The world's area of natural forests diminished by 5.7% between 1990 and 2010, from 3.99 to 3.77 billion hectares (ha). During the same period, the area of planted forests increased

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by 54%, from 171 to 264 million ha (FAO 2010). This suggests that planted forests are competitive with other land uses, and that they contribute more to the success of landscape management than natural forests do. Although planted forests may be not as beneficial to the environment as natural forests, they are better than pastureland or cropland.

The area of planted forests increased rapidly between 1990 and 2010 in North and Central America (93% increase), Asia (73%) and South America (70%), according to FAO (2010). In Brazil, forest plantations are financially more competitive than pastureland. This is a positive trend, because conversion to pastureland is the main driver of deforestation; it exposes soils to sunlight, rain and winds and dries and degrades them. In contrast, planted forests protect the soil from erosion and surface run-off, and help it recover by increasing organic matter.

Monetary factors

Natural forests provide higher-quality services, but planted forests can often provide products in larger quantity. In Brazil, the productivity of natural forests in terms of wood is generally 1 to 5 m^3/ha/year, compared to 10 to 50 m^3/ha/year in planted forests. Even though planted forests have higher management costs per ha and lower prices per cubic metre of product, planted forests generate an average internal rate of return (IRR) of around 15%, compared to 5% in sustainably managed natural forests.

A higher IRR compensates for the challenge of establishing and managing a planted forest. In Brazil, forest producers prefer areas that have already been converted to pastureland, with deep and well-drained soils and flat terrain; they also prefer forests that are located near transportation infrastructure. An application of lime is required to neutralize the soil acidity. Leafcutter ants are a major threat to plantations, and it is costly to combat them. Advanced technology (seed selection, cloning) is required to produce healthy seedlings, and good planning is required to ensure adequate genetic material for the plantation's future productivity. A nearby timber industry is necessary to provide purchasers for the timber.

Management

Forest management needs to consider forest plantations from a landscape perspective, since they comprise a range of elements. These include remnants of natural forests and native ecosystems, which increase the level of plant and animal biodiversity (Carnus et al. 2003). The Brazilian Forest Code requires all rural land managers to set aside remnants of natural forest areas for environmental protection and conservation purposes. These areas are divided into two main categories: Permanent Preservation Areas (APPs) and Legal Reserves (RLs). Together, they form natural forest buffers that serve as wildlife corridors.

Land-owners (including forest plantation owners) strongly resist the forest code. Their main complaints include the fixed distances of APPs (which are established by law) and the requirement to keep a certain percentage (20–80%) of property as RLs. The code is flawed regarding these two points. In terms of APPs, establishing fixed distances from the

edge of a river is difficult; in addition, they do not consider the existence of floodplains, highly eroded soils and other sensitive areas. As for RLs, fixed percentages can provide a perverse incentive for rural land-owners to cut down natural forests.

Both APPs and RLs should be case-specific and should be based on aerial photos or satellite images. In the case of APPs, riparian zones could be measured from the stream high-water mark, and be increased according to the slope and vegetation type of the riverbank. RLs should be established in rural properties based on natural forest remnants.

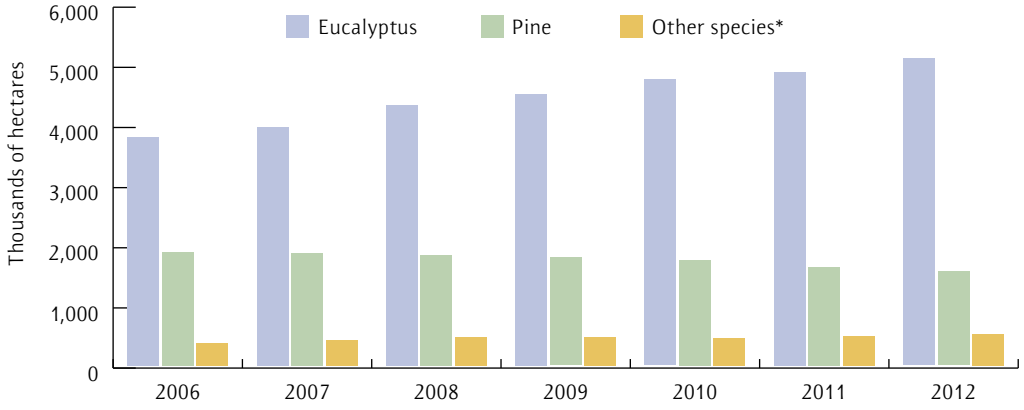
Private land-owners should be financially compensated for maintaining APPs, as these areas cannot be used for production. Legal reserves can be managed sustainably for production, although the administrative procedures to obtain sustainable forest management permits are more complex than for clear-cutting permits (Hirakuri 2003). This means that land-owners prefer to convert their natural forests to pastureland or other land uses. The forest code permits up to 80% of the natural forest on a property to be converted to other uses. Without economic income from the natural forests, land-owners are motivated to convert them to other uses, which unfortunately is still being done.

Forest plantations in Brazil

In Brazil, planted forests are unquestionably competitive with natural forests. For example, according to IBGE (2014), total timber production in Brazil increased by 29% — from 185 to 238 million m³ — between 2000 and 2012; the percentage of planted forests in this total increased from 61 to 79% during the same period.

Most of the increase in timber production from planted forests came from eucalyptus plantations (Figure 1).

Figure 1. Area of planted forest area in Brazil, 2006–2012



*Other major species include acacia *(A. mearnsii, A. mangium)*, Rubber tree *(Hevea brasiliensis)*, *Paricá (Schizolobium amazonicum)*, teak *(Tectona grandis)*, Paraná pine *(Araucaria angustifolia)* and poplar *(Populus spp)*.
Source: ABRAF (2013)

Globally, about 20 of the 600 species of eucalyptus are commercially planted on 21 million ha across more than 100 tropical and subtropical countries; India and Brazil have the most planted area (EMBRAPA 2010).

Eucalyptus is popular due to its fast growth, adaptability to a range of climate conditions, rapid biomass and nutrient accumulation, high soil moisture retention and high-quality timber. Its commercial use in Brazil started in the early 1900s; at that time, most eucalyptus plantations were managed with the use of fire. The constant use of fire causes soil degradation, and after the 1970s this practice was replaced by more modern silviculture techniques.

Some people still wrongly associate eucalyptus plantations with the soil degradation caused by the use of fire, and believe that eucalyptus dries the soil or causes other negative effects. There has been much discussion of this issue. Srivastava, Kumar and Prasad (2003) confirm that annual trends in soil moisture are similar for plantation and non-plantation sites. Guariz et al. (2009) show that the soil under a eucalyptus plantation has higher moisture content than that under pastureland.

When managed without the use of fire, eucalyptus quickly rehabilitates degraded areas. As it grows, it protects the soil from erosion and increases its fertility. According to Silveira (2005), although eucalyptus plantations have lower biodiversity than natural forests, the forest understorey in these homogenous forests can provide food, shelter, protection and a favourable environment for wildlife.

The presence of a diverse and healthy understorey in eucalyptus plantations also shows that this species has no harmful effects on other plants, as demonstrated by Oliveira et al. (2010). About 30% of eucalyptus plantations in Brazil are certified by the Forest Stewardship Council (FSC), which requires that they be managed according to strict sustainability criteria.

Mato Grosso do Sul State Plan for Sustainable Development of Planted Forests

Due to the economic success of eucalyptus plantations, several state governments of Brazil have implemented forest development plans using the species, including the states of Piauí (2005), Mato Grosso do Sul (2009), Mato Grosso (2014) and Tocantins (under development). All these plans were developed by STCP, a Brazilian forest engineering, consulting and management company, with the participation of the authors. The plans feature integrated and sustainable management of natural and planted forests, and aim to attract investment to the industry.

The plan for Mato Grosso do Sul has been the most successful to date. The state government, in collaboration with the Brazilian Support Service for Small Entrepreneurs

(SEBRAE) and the State Association of Producers and Consumers of Planted Forests (REFLORE-MS), hired STCP in July 2008 to develop the state plan, which was approved in March 2009.

Mato Grosso do Sul covers 359,000 km² in west-central Brazil; 73% of the state is flat or rolling hills (Figure 2). Soils adequate for forest plantations cover 69% of its area. The climate is tropical seasonal, with a mean annual temperature of 23°C and an average annual rainfall of 1,440 mm. The wet season lasts nine months (STCP 2009).

It is one of the least populated states in Brazil, with 7 inhabitants/km². The state has about 65,000 rural properties: 67% are small (less than 100 ha), 23% are medium-sized (100 to 1,000 ha), and 10% are large (more than 1,000 ha). It was originally covered by cerrado forest, but natural forest cover now comprises only 20%; pastureland covers 70%, cropland 7%, and other uses 3%. The area covered by natural forests continues to decrease due to conversion to cropland and pastureland. Planted forests are increasing in areas previously converted to pastureland.

Figure 2. State of Mato Grosso do Sul, Brazil

Prepared by Gabriel Penno Saraiva (2014)

An assessment was carried out during the initial phase of the PEF/MS. Researchers visited several stakeholders involved in the process, including forest producers. The goal was to find good examples that could be replicated, such as the most productive species and genetic materials. Small land-owners were not included because they generally lacked forestry knowledge or were cattle ranchers.

Most of the existing plantations were well managed in terms of silviculture (90%, based on eucalyptus). However, their integration into a sustainable landscape that provides economic, environmental and social functions was not optimal; almost none of the forest plantation producers respected the APP and RL requirements.

An action plan was developed that included six strategic programmes: 1) legal and institutional framework; 2) attraction of investment; 3) tree farmer scheme; 4) technological development; 5) market information; and 6) monitoring and evaluation. These programmes focused principally on production and financial aspects. Although the forestry development plan identified the need to meet the APP and RL standards and other environmental requirements, there was no specific programme to do this, so these requirements were not properly addressed. In practice, the state government has focused mainly on attracting investors.

The tree farmer scheme is carried out by private companies that find medium-sized land-owners to be their partners. Its objective is to expand wood production by small farmers and land-owners in the region within the PEF/MS framework. The scheme provides farmers and medium-sized rural producers with an alternative source of income. It also uses and rehabilitates degraded land, and decreases the pressure on natural forests to supply wood.

Providing technical assistance for small land-owners has been only partially implemented by the government. This inertia, typical of Brazilian governments in all levels (federal, state, municipal), also plagues the PEF/MS in general. Despite this inaction, the area covered by planted forests in Mato Grosso do Sul in 2012 was 587,000 ha, a 393% increase from 2006 (ABRAF 2013). This includes small land-owner properties, since scientific knowledge about silviculture and forest management has become increasingly widespread.

After the establishment of the PEF/MS, private companies such as Fibria, International Paper and Eldorado built pulp and paper mills in the state to use eucalyptus wood as raw material. The total investments in forests and industries may reach US$ 10 billion by 2020 and generate a total of 43,000 direct jobs (SEBRAE 2009).

Replicating success

Planted forests can be important in the development of rural areas and restoration of degraded land. To be viable, however, they must have high productivity. Attracting industrial processing and manufacturing plants is also crucial to forestry development, since they add value to the production of raw materials from forest plantations, which are costly to establish. Generally, plantations are not established to rehabilitate degraded land, but they do generate positive environmental impacts such as climate regulation through carbon sequestration.

The various levels of governments in Brazil should make more efforts to incorporate forestry into rural policies. Administratively, the federal government placed forestry in the Environmental Ministry (MMA), but it might be more appropriate inside the Agriculture Ministry (MAPA). MAPA would then be responsible for implementing APPs and RLs in the landscape, and carrying out technical assistance programmes to educate rural producers on the benefits of forests and on how to plant and manage them. It would be beneficial for MMA and MAPA to better coordinate their efforts in terms of forestry. The two ministries currently prepare forestry development plans separately. This fails to realize

potential synergies, and the plans are rarely implemented or monitored fully, resulting in a waste of valuable public resources.

In Mato Grosso do Sul, most eucalyptus plantations do not replace natural forests, because most forested areas in the state had been already converted to pastureland. In the state of Piauí most planted forests replaced natural forests; however, most of the natural forests had already been degraded due to the practice of local farmers to burn the understorey vegetation.

The PEF/MS is a successful initiative in economic terms, and it is being copied by other states in Brazil. Improvements can still be made in administrative arrangements, however, especially in providing technical assistance to small land-owners.

REFLORE, the institution that encouraged the creation of the plan, is a non-governmental organization, and other NGOs were also involved in the development process. They are aware that eucalyptus plantations are better for the environment than pastureland, but they demand that all forest producers comply with the APP and RL mechanisms.

The largest forest producers in the state, Fibria and Eldorado, have certified all their forest plantations with FSC. This supports environmental sustainability.

A landscape approach acknowledges that agriculture, water, forests and food security are all connected. Given the linked challenges that these sectors face, it is necessary to use a cross-sector approach to find integrated solutions at the scale of entire landscapes. This is crucial to preserve the ecosystem services that the forests — and landscapes — provide.

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4.5 Landscapes and the voluntary carbon market, West Sumatra

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Introduction

Funding from the voluntary carbon market (VCM) can help to restore productive landscapes, if it is embedded in the local context of traditions and in state governance systems. Restoration efforts under a performance-based VCM programme, if planned well, can also improve livelihoods.

West Sumatra is home to the Minangkabau ethnic group. Indigenous traditions in governing the land continue to be strong. The *nagari* comprises the village and agricultural land. It is headed by the *wali nagari*, who is elected by the villagers. Land ownership — or more precisely, the right to use the land — is governed through locally defined rules called *adat* (von Benda-Beckmann and von Benda-Beckmann 2004). The *adat* council is the highest governmental body of the *nagari*. The *nagari* leaders govern and enforce norms and conventions for the sake of overall prosperity.

Irrigated ricefields, located in valley bottoms, are surrounded by hills consisting of mixed tree-based systems and patches of forest. Ricefields are managed by and inherited through the female line of the family. The surrounding hilly landscape is usually communally managed, either at the level of (extended) families or at the communal *nagari* level (*tanah ulayat nagari*). The *hutan nagari* (nagari forest) is managed at the *nagari* level. The hilly dryland agricultural areas belong to (extended) families, with two main types of land ownership under the *adat* system: tribal land (*tanah kaum/suku*) and king land (*tanah rajo*).

The approach is a practical way for communities to engage in collective action to restore degraded landscapes.

Tribal land is owned by members of customary groups under the matrilineal system. King land is open-access land; it is owned by whoever initially cultivated it. It can be inherited, but cannot be sold. It is managed and controlled by the oldest man in the

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matrilineal lineage. These traditional rules are well-defined and are enforced, but formal rules enforced by the state are also in place. Most state forest land is situated beyond the boundaries of the *nagari*.

In the past, the hills around Singkarak Lake in West Sumatra were covered with productive tree-based systems and forested areas in various configurations. However, recurrent wild-fires, severe pests and diseases have changed this landscape into *Imperata* grasslands. Land degradation and intensified water run-off have become major problems, putting stress on the water supply for rice irrigation. This, in combination with increasingly erratic rainfall patterns caused by climate change, has made these grasslands very susceptible to fire.

Although local communities see the importance of rehabilitating the surrounding hilly landscapes, few individuals make attempts to restore productive tree-based landscapes. Any attempt to successfully restore *Imperata* grassland landscapes and control the fire risk requires collective action. A coordinated effort, facilitated by a non-local individual or organization, would be required to restore the degraded landscape, as *Imperata* grasslands have become firmly established since the 1970s.

Collective action must strike a balance between the public good and private benefits. A Netherlands-based social enterprise, CO^2 Operate BV (Box 1), took up this challenge and began facilitating the rehabilitation of the degraded lands through community action. Funds from the Food and Agriculture Organization (FAO) supported the communities to develop public benefits in the form of training to restore the forest using Assisted Natural Regeneration (ANR). Carbon funds from CO^2 Operate BV enabled private benefits by supporting individual farmers in obtaining and managing economic valuable trees, which were combined with the growing trees as part of forest restoration activities.

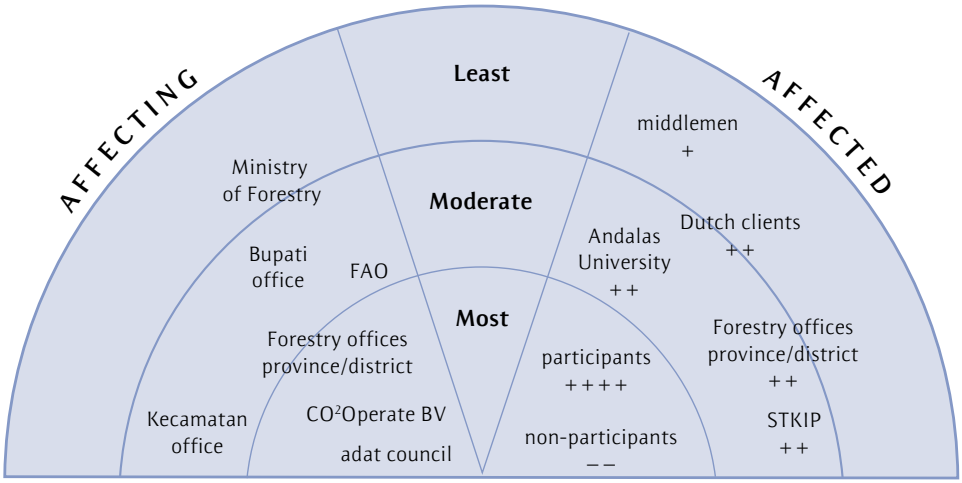
Box 1. CO^2 Operate: a social enterprise

A social enterprise is a private company that applies commercial strategies to significantly improve human and environmental well-being. CO^2 Operate facilitates the process of carbon neutral production, both in the for-profit and non-profit sector. The fees levied on CO_2 emissions are invested in landscape restoration. Economically valuable agroforestry landscapes are established for and with the local population. This makes landscapes more productive, fulfils ecosystem service functions, provides tree products, thus significantly improving rural livelihoods and restoring some biodiversity. CO^2 Operate facilitates 136 ha, 55 ha in West Sumatra and the rest in West Java. In June 2014, another 20 ha were added to the West Sumatra sites.

Governing the lands: conflicting provisions

Many different people and institutions are involved in landscape restoration. Over the years, CO^2 Operate has built a strong network of collaboration with important stake-holders in landscape restoration at the national and *nagari* level in the region (Figure 1). They are all important to the success of restoration activities.

Figure 1. Stakeholders in landscape restoration



Based on an identification of stakeholders (Figure 1), and the experience with *adat* and its leaders, CO^2 Operate approached the village *adat* council to see if they wished to ollaborate. The *wali nagari,* being part of the *adat* council, would then automatically be involved as well. A process of Free, Prior and Informed Consent (FPIC) was initially carried out to see if the community was interested in the programme. Through FPIC the proposed intervention was fully explained to the community members and local indigenous bodies to determine if they agreed to the project. The FPIC process aimed at providing full and accurate information about the implications of the project on the communities and their customary land, and allowed them to modify components that suited their needs and aspirations.

The performance-based contract was also discussed in detail, including the rights and responsibilities of CO^2 Operate, the village *adat* council and the participating farmers. Once adjustments were made and consensus was achieved, the programme began. Customary norms and conventions guided the VCM institutional structure. Collective action was established by organizing individual farmers in groups; each group was responsible for a specific land area. The farmer groups were coordinated by village elites, in line with the *adat* hierarchical system.

Unfortunately, the strong influence of the village elites made group members reluctant to speak out to demand corrective action, especially against the elites. After some time, however, group members began to protest against the chieftaincy of the elites, as the leaders seemed to be frustrating rather than supporting the rehabilitation efforts. Protests intensified when a conflict developed due to a delay in handing over the seedlings by the village elites to the members of the farmer groups. Seedlings, which would eventually provide individual economic benefits for the participants, included clove trees, mahogany and various types of fruit trees. These disputes resulted in the forced resignation of the *wali nagari* as project coordinator; he was also forced to resign as the head of

the *nagari* after villagers lodged an official complaint at the governmental district office. As a consequence, the village elite, including *adat* leaders, also resigned.

The farmers renegotiated the rules and requested a new, simplified and direct agreement between themselves and CO^2 Operate. In 2011, the new w*ali nagari* and the *adat* council agreed that they would not be direct partners in the project. Instead, they suggested that they could have a function in conflict resolution. A new collaboration emerged spontaneously among the farmers, as they formed their own groups, consisting of relatives, neighbours and those willing to work together in equal partnerships. They also chose their own group leader. This increased effective collaboration within and between farmer groups. Due to this revised structure, the participants asked CO^2 Operate to support them in applying for formal (cooperative) status for each farmer group. This cooperative structure has shown to be very effective in rehabilitating the land, and has allowed farmers to reap benefits at the level of the cooperative and in individual livelihoods.

Improving rural livelihoods

The cooperatives work closely together to rehabilitate the land. Annual carbon payments under the VCM contract are made to the cooperatives, not to individual farmers. The livelihoods of individual farmers have started to improve significantly now that various tree products can be harvested, cloves being the most valuable. The first small harvest of the four-year-old planted clove trees earned each farmer €1,000. This revenue was generated from about 15 producing trees. Since they planted around 200 trees, and a future average harvest could be 40 kg per tree, their annual income from clove trees might reach around €8,000 (at current price levels). This is very high when compared to the official 2014 minimum wage for West Sumatra, which is €100 per month. In addition, planted fruit trees provide food, while surpluses are sold in the local market. Long-term sustainability comes from the planting of mahogany trees as a living fence, planted as a saving for their children.

Additional income is generated at the cooperative level. The annual carbon payments are invested in production activities. One cooperative invested its carbon revenues in a cattle-feeding programme. The sale of the first animal brought substantial new funds into the cooperative, which will be used for further economic development. Another cooperative, made up of all women, used the carbon revenue to cultivate ginger in between the growing trees as a short-term food and cash crop. Other cooperatives began to convert additional land for rehabilitation. One cooperative recently initiated a savings programme. Every week, members put 20,000 rupiah (€1.5) from the earnings of the agroforestry products into the cooperative's account. The formalized cooperative structures have also enabled the groups to apply for government funds. One group received funds to build a paved path for easier access to their fields with a motorcycle. Another cooperative received 50 million rupiah (around

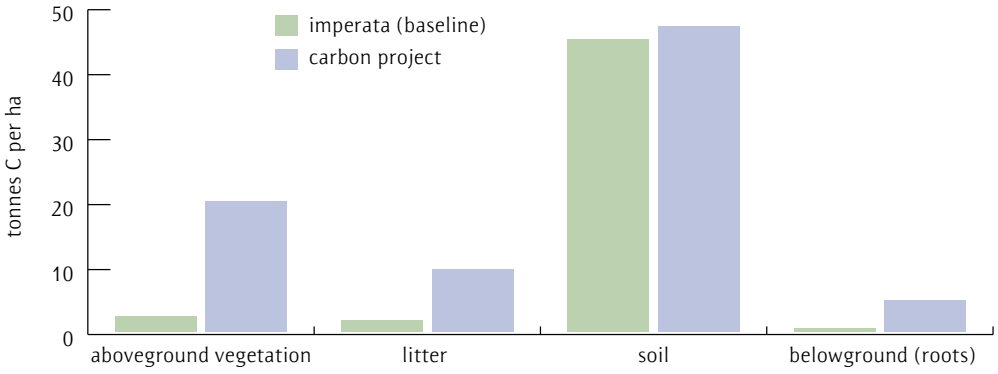
€3,200) from the forestry department to set up a village nursery with 35,000 seedlings, including timber trees, fruit trees and clove trees. Besides adding more land, seedlings were sold to individual villagers. Although these villagers were not part of the VCM programme, they saw the benefits of the restoration activities. They also practice ANR, which they learned from current VCM participants.

Carbon stock performance

In a VCM programme, an important component in restoring a productive landscape is the extent to which the CO_2 sequestration meets the compensation targets of the clients. They requested that CO^2 Operate invest in the rehabilitation in support of their carbon neutral mission. In December 2013 a carbon assessment was conducted in collaboration with Andalas University and the teacher's college STKIP, both in Padang. All participants received field training to assess carbon stocks above ground, below ground and in the litter and the soil. The university's laboratory facilities were used to analyze carbon in the litter and soil.

The data revealed that 64% of the carbon was stored in the soil. The total increase in carbon was 31.8t C/ha compared with the baseline (pure *Imperata* grasslands with hardly any remaining trees; see Figure 2). The trees had a heterogeneous age structure, varying from one to four years old. This heterogeneity was partly caused by the planting contracts of the VCM programme, which were spread over several years (2009–13). In addition, the initial challenges to the leadership caused a delay in planting, as did the delay in handing over seedlings. This was compounded by the effects of El Niño (2009–10), which killed many trees. To accommodate for the different ages and planting densities, sample plots were set up that represented all variations. Despite the initial challenges, the rate of biomass accumulation needed to achieve the carbon sequestration targets of the clients remains on track, especially since the trees are not expected to show their largest gains in biomass until three to four years from now. The adoption of ANR practices proved to be an important component to achieve carbon sequestration targets.

Figure 2. Carbon stock per ha on Imperata grasslands after three years



Source: Baseline situation: taken from Lusiana et al. (2005).

Assisted natural regeneration

Accelerating carbon sequestration

The usual regeneration practice carried out by the project consisted of opening up *Imperata* grasslands by slashing, uprooting and clean-weeding, followed by planting trees. This caused the bare soil to dry out quickly, a problem aggravated by the drought period caused by El Niño in 1999–2000.

Early in 2012, FAO began looking for options to field-test ANR as a low-cost option to restore forests on degraded lands. CO^2 Operate BV was selected to test ANR in Indonesia; the FAO project is also carried out in the Philippines, Laos and Thailand. With ANR, *Imperata* grasses are no longer uprooted and removed, but simply pressed flat with a wooden plank. Small tree seedlings, commonly found in between the grasses, are protected and can grow, as competition for light no longer suppresses their growth. This practice has improved tree growth of the natural occurring trees and planted trees beyond expectations, providing quick gains in carbon stocks. Farmers were enthusiastic about the ANR practices, especially in combination with economical valuable agroforestry trees, which are given a favourable micro-climate by the fast-growing indigenous trees under ANR treatment. The pressed *Imperata* grasses form a thick blanket, which reduces soil temperatures and keeps the soil moist, even after a dry period lasting five to six weeks. Farmers talk about *tanah dingin (*cold soil), referring to the moisture content and hence the slightly lower soil temperatures. The decaying *Imperata* provides additional carbon to the soil.

Lessons learned

Since the project began in 2010, a number of challenges have been overcome. A workable governance structure is now in place, along with innovative technology. Using ANR and tree planting, rehabilitation occurs much faster compared to natural forest restoration in *Imperata* grasslands. A study by Yassir, Van der Kamp and Buurman (2009), shows that it could take at least nine years before *Imperata* disappears under natural forest regeneration, or even longer if fires occur. Since the VCM activities began, not one fire has occurred, suggesting that people have become more careful with their environment. The approach has proved to be a practical way for communities to engage in collective action to restore degraded landscapes.

Adaptive institutional arrangements

Although indigenous practices and laws are often championed for their ability to achieve development and sustainability goals, more formal rules and organizational structures may be needed when implementing a performance-based activity such as a carbon sequestration programme. Under the right conditions, collective action could be a good option in a context where community-based management is well embedded. However, this

approach will work only if all cooperatives participate equally and fairly. All members must feel free to discuss any matter that will help to improve the performance of restoration activities.

Carbon sequestration

ANR has the potential to speed up carbon sequestration in the initial years of a carbon sequestration programme, both above and below ground. As an isolated activity, ANR does not provide a large enough incentive to restore degraded landscapes in the Sumatran context. However, if ANR is combined with schemes that generate short-term benefits (such as carbon payments or short rotation crops) and longer-term economic benefits (for instance, from harvestable agroforestry trees), it can be very effective.

Participating farmers need to have a full understanding of carbon sequestration and carbon trading. Once they better understand carbon benefits, they begin to protect existing trees in their fields, knowing that the trees hold their value as long as they are not cut down and provide good conditions for agroforestry. It also helps to stimulate the understanding of the importance of ANR. Understanding carbon sequestration and the carbon market is therefore an important subject for training sessions.

Restoration of ecosystem services and biodiversity

Although the restored areas are still relatively small (55 ha, but with an additional 20 ha as of June 2014), the farmers already see environmental benefits. After ANR treatment the soil remains moist for a long time, which helps the trees grow. At a larger scale, ANR is expected to be able to regulate the water supplies for irrigation of the ricefields in the valley. Another change is the fact that after almost 40 years, more and more plants and animals are returning to the rehabilitated agroforestry areas. Birds, monkeys, wild boar, small and large deer are seen regularly. Although they eat the leaves of the growing trees, this has not caused problems to date. The areas are also increasingly used as a corridor between forested areas, judging from the many animal tracks that are seen.

CO^2 Operate continues to work in West Sumatra with local partners and has started to scale up landscape restoration activities. The methodology is now integrated into the West Sumatra government programme, as part of a benefit-sharing mechanism that is part of REDD+ activities.

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4.6 Commercial bamboo plantations as a tool for restoring landscapes

ECOPLANET BAMBOO

Introduction

Converting degraded and marginal land into commercial plantations of bamboo[1] can restore canopy cover, connect remnant forest patches and their associated biodiversity, reduce soil erosion and stabilize water tables. It can also provide revenue and alternative livelihoods for surrounding communities. Selective harvesting focuses on the removal of individual poles or culms from each bamboo plant, ensuring that canopy cover and carbon storage is continuous and avoiding the need to replant. Bamboo's complex but shallow root structure restores compacted soils and improves water filtration.

Bamboo can also provide an alternative fibre to wood in the use of engineered timber products, pulp and paper, charcoal and bioenergy, thereby reducing pressure on natural forests.

Although bamboo is an ancient crop in China, with many benefits, its use as an alternative fiber has had limited success until recently. Technological barriers to silviculture and processing, limited investment into research and development, and a lack of planting material have been the causes.

BAMBOO CAN BE USED TO RESTORE LANDSCAPES AND PROVIDE AN ALTERNATIVE TO TIMBER.

Yet these barriers have been an environmental blessing. A global framework for the industrialization of bamboo has been established that ensures that it is grown commercially only as a deforestation-free crop, and on degraded land so that it does not compete with food production. Legislation and policies are starting to be written at the country level,[2] and a certification standard is being designed[3] to ensure that project managers use best practices, for circumstances where existing standards such as the Forest Stewardship Council (FSC) do not apply.

The founders of EcoPlanet Bamboo[4] realized that supply and demand, and the world's ever-increasing appetite for timber were, for the most part, being excluded from the

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EcoPlanet Bamboo is a privately held U.S.-based owner and developer of commercial bamboo plantations. It is based in Chicago.

context of REDD+ initiatives. EcoPlanet aims to prove that commercial plantations of bamboo can be developed on land that meets strict environmental criteria, and can provide a sustainable alternative fibre to meet the growing global demand. With more than US$ 50 million committed, EcoPlanet Bamboo set out to show that bamboo can be an economically viable part of large-scale landscape restoration, with positive social and environmental impacts.

Successful case studies

Nicaragua

EcoPlanet Bamboo began operating in Nicaragua in 2011. The project uses *Guadua aculeata*, a native species of giant clumping bamboo that occurs naturally within the forest, to restore 6,500 hectares (ha) of highly degraded land into commercial plantations and provide more than 250 permanent jobs. An additional 600 ha of remnant patches of tropical forest have been conserved, resulting in habitat connectivity and a more diverse ecosystem. Another 1,000 ha is undergoing restoration.

Located within the semi-autonomous Southern Atlantic State of Nicaragua's Caribbean coast, the project targets an area that has seen considerable large-scale deforestation.

In one of EcoPlanet Bamboo's farms, deforestation and degradation have resulted in a mosaic landscape; scattered patches of remaining forest are interspersed with grasslands where the soil is compacted in many places. High levels of poverty combined with the extreme damage to the landscape mean that these areas are unlikely to regenerate without human assistance. Few species can survive in the compacted clay soil, which is leached of nutrients, or adapt to the heavy and frequent rainfall of the tropical climate.

Guadua aculeata, which shows mass flowering every 80 or more years, flowered in Nicaragua during 2009–11. This allowed EcoPlanet Bamboo to use native seed, adapted to local conditions, in its plantations. Only land that was under private ownership was included in the project area. No ripping of the land occurred, and existing trees were left in place to provide additional biodiversity benefits, with the bamboo planted among them. This diverse mix supports the restoration of a semi-native forest ecosystem, and restores much of the biodiversity originally found in the area.[5]

Stringent certification standards were applied on these plantations, ensuring that sustainability criteria were built into the operations from the onset. The plantations were certified under several schemes, despite the high capital costs and the costs associated with annual audits, in order to set a benchmark for bamboo plantations globally. Carbon validation and verification has occurred under the Verified Carbon Standard (VCS) in combination with gold-level Climate, Community and Biodiversity Alliance (CCBA). Forest management certification by the Forest Stewardship Council (FSC) ensures that the plantations are responsibly managed.

South Africa

In 2012 EcoPlanet Bamboo used a different model in South Africa's Eastern Cape. There, the restoration of 480 ha of land that was depleted by over a century of chemically intensive pineapple farming, focused on the regeneration of exhausted agricultural soils. The project also stimulated local economies by providing an alternative fibre for international carbon and charcoal markets.

Bamboo is not part of the natural forest matrix in the country and isn't recognized as a forest species. In South Africa, as elsewhere, this poses a number of policy challenges. It is unclear whether bamboo plantations should be under the jurisdiction of the Ministry of Forestry, the Ministry of Agriculture or some other entity. The ecology and growth patterns of bamboo are those of a grass, and yet a grove of giant bamboos, more than 30 metres tall and with diameters not dissimilar to trees, have some of the characteristics of a forest. Furthermore, bamboo provides a fibre that is similar to wood.

In South Africa, giant bamboo, including *Bambusa balcooa*, EcoPlanet Bamboo's species of choice, was introduced in the 1920s to develop a domestic paper industry. Subsequently, farmers frequently planted them alongside natural vegetation, and today they are found in clumps across the landscape of the Eastern Cape. Although patches of native riparian vegetation are still intact, the project areas in South Africa differ from those in Nicaragua. They host no standing trees, and even after more than five years of laying fallow following pineapple cultivation there are few signs of ecosystem regeneration. Blocks of bamboo are planted in a mosaic alongside existing wildlife corridors and native vegetation.

The South African case is the first example in the world of large-scale restoration using tissue culture plantlets[6] to overcome a lack of planting material. The lack of restoration projects that used tissue culture plantlets had been a major barrier to the industrialization of bamboo outside of China. EcoPlanet Bamboo invested heavily in the technical science behind the laboratory development of plantlets at a commercial scale and in ensuring their transition and survival in a landscape setting. The project has restored 345 ha of highly degraded land, preserved more than 140 ha of wildlife corridors and native vegetation, and created approximately 100 jobs in an area that has suffered severe unemployment since the crash of South Africa's pineapple industry.

What does successful restoration mean?

To be successful, landscape-level initiatives must restore an ecosystem to a fully functioning state. This results in intact water and carbon cycles, healthy soils and flourishing biodiversity.

Giant bamboo is able to facilitate such restoration in a number of ways. The root system of clumping bamboo does not spread beyond the centre of the plant; it forms an intricate network that has the ability to break up compacted soils and restore permeability and aeration. It also slows the flow of water through the layers of soil.

Each individual clump puts up multiple stems or culms each year. These break through the soil and create a multi-dimensional structure, providing habitat for a range of insects, birds and mammals. The giant culms and their associated root system also form a considerable carbon reserve. As the bamboo clumps develop they begin to shed large volumes of leaves, which form a litter layer that is protected by the canopy. These leaves decompose and increase the organic content of the soil and the associated soil carbon.

The critical aspects of the ecosystem are controlled and regulated, enabling other species to grow and thrive. The growth pattern of bamboo means that the removal of individual culms from each plant does not harm the ecosystem. In contrast, it stimulates further growth, since in a well managed stand, the removal of mature material frees up space and resources, which in turn stimulates the faster and more frequent emergence of new culms. That makes it a fully renewable resource.

Overcoming barriers

Both case studies are examples of restoration at the landscape level that meets stringent economic, environmental and social objectives and overcomes the barriers associated with forest restoration that are listed below.

Lack of access to capital

Restoration efforts often focus on planting native species, but fail to provide the funds for the long-term efforts required for ecosystems to become self regenerating. Tree plantations also require long-term capital.

EcoPlanet Bamboo's model overcomes these capital requirements in two ways. Carbon finance provides funds in the early years. Significant volumes of atmospheric CO_2 are absorbed and transformed into woody biomass between years four and eight, which is also the time when financial requirements are highest, due to accumulated debt. The Nicaraguan project has been validated by the VCS for approximately 1.5 million tonnes of CO_2 removal. Access to carbon finance also dictates that only land that meets strict eligibility criteria is accepted for inclusion, ensuring that the bamboo itself does not degrade the land.

Political risk insurance[7] was also significant in overcoming many of the barriers in regions that have a high perceived risk from a capital perspective. Access to such

insurance protects the investments raised for restoration efforts, and encourages additional project development.

Insecure land tenure and associated ownership rights

Insecure land tenure and resource ownership often causes restoration efforts to fail. In many areas trees represent income and a source of fuel, which often leads to conflicts about ownership or use rights. These in turn threaten the success of ecosystem restoration.

Traditionally, some large international environmental NGOs have been opposed to private land ownership of environmental initiatives. However, in both Nicaragua and South Africa owning the land was fundamental to EcoPlanet Bamboo's ability to raise money for species that had not been grown in a commercial setting, and in countries with high perceived risks. Ownership allowed investment to be guaranteed against the land and facilitated the ability to scale up restoration efforts.

Lack of clear land tenure and secure ownership rights are limiting factors as EcoPlanet Bamboo selects suitable countries for new projects. Improvements to legislation and policy within countries seeking restoration efforts can assist in the facilitation of such projects.

Drivers of deforestation

Without addressing the underlying drivers of deforestation and land-use change, it is unlikely that restoration efforts will succeed. EcoPlanet Bamboo's approach chooses areas where deforestation can be curbed by improving livelihoods and by eliminating unsustainable practices through the empowerment of local communities and the provision of alternative livelihood options.

Commercial plantations versus a smallholder model

As listed below, there are many reasons why a smallholder model is unlikely to be successful at the scale required to achieve restoration at the landscape level, provide fibre and resource security, and establish a commercially viable initiative.

High capital requirements

Although bamboo is a fast-growing plant, the provision of commercial-diameter culms requires an initial seven-year period of high capital requirements, particularly when the bamboo is grown on degraded land. This is likely to be too long for smallholders and is a reason for the lack of success of small-scale bamboo projects.

Logistics

Transportation of raw bamboo is key to the success of initiatives in remote rural areas. Drying and pre-processing is necessary in order to reduce costs and facilitate

transportation. In a smallholder model, where individual plots are usually located at a distance from each other, it is likely that the costs of transportation, combined with the labour required, would make bamboo an unattractive option for such farmers.

Standardization, quality and security of supply

For major industries to shift to bamboo as an alternative fiber, the supply must be secure. Like any other crop, bamboo requires considerable inputs and management to be produced commercially. The level of these inputs affects productivity and the quality of the fiber. A smallholder model is unlikely to be able to provide enough high-quality resource for a large-scale industry, and lower levels of processing (such as handicrafts) cannot sustain the costs associated with production. The social and community aspects of EcoPlanet Bamboo's model have focused heavily on job creation in areas with few opportunities for secure and attractive jobs. It also focuses on empowerment of women and the provision of services, including health care and education.

Scaling up restoration

Scaling up restoration efforts to the level necessary to achieve a significant global impact requires a shift in approach from NGOs to the private sector. EcoPlanet Bamboo's model proves that maximizing social and environmental impact does not come at the expense of profits, but in fact is at the core of such profits. The non-profit and public sectors can make a significant contribution to large-scale restoration, however, and to a shift from unsustainable sources of wood to bamboo as an alternative fibre. Identification of suitable regions, policy and governance work, ensuring the security of land tenure, and the provision of low-cost capital could all lead to further expansion of such projects.

EcoPlanet Bamboo's experiences in Nicaragua and South Africa have provided lessons for larger-scale (40,000-ha) projects to regenerate degraded land into commercially viable plantations that are fully integrated into the forest matrix. Successful initiatives will develop these plantations as dedicated fibre sources for specific end users.

Such projects will provide a dual advantage: the restoration of hundreds of thousands of hectares of degraded land into fully functioning and biodiverse ecosystems; and the provision of an alternative to wood, which will reduce the pressure on the world's remaining forests.

Endnotes

1. This is clumping, or sympodial, bamboo.
2. In Ghana, for example, the Forestry Commission has included bamboo in its definition of forests, allowing it to be planted as a plantation species within a forestry concession. In contrast, Indonesia currently excludes bamboo as a forest species, preventing it from being planted in forestry concessions.
3. More information on the Rainforest Alliance stewardship standard for alternative natural fibers such as bamboo can be found at www.rainforest-alliance.org/agriculture/standards/alternative-natural-fibers.
4. EcoPlanet Bamboo is a privately held U.S.-based owner and developer of commercial bamboo plantations. The company is headquartered in Chicago, Illinois, and currently has operations in Nicaragua and South Africa; it is expanding into Ghana. For more information please visit www.ecoplanetbamboo.com.
5. Further details on the project's biodiversity benefits can be found in the CCBA project design document, including full species lists. See www.climate-standards.org/2012/07/14/ecoplanet-bamboo-central-america.
6. Tissue-culture plantlets are produced in laboratories. Copies of a plant are produced in a sterile culture medium. These use parent material from natural plants; they are not genetically modified.
7. This was provided through the World Bank's Multilateral Investment Guarantee Agency (MIGA), which provided a US$27-million policy. MIGA is in the process of expanding this policy to include the South African project.

4.7 Modernization of wood energy in northern Madagascar

HANNES ETTER, STEVE SEPP, KLAUS ACKERMANN, DANIEL PLUGGE and MARK SCHAUER

Introduction

In Madagascar, as in much of sub-Saharan Africa, wood is the most important source of domestic energy. It will likely remain so due to population growth and urban consumption. Charcoal is replacing firewood in urban centres, easily tripling the amount of wood that is extracted. This situation is worsened where low-efficiency conversion and combustion technologies are applied.

Firewood use and charcoal production from natural forests was threatening to turn fertile landscapes into moonscapes in the extreme north of Madagascar. The national government asked *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) for assistance with energy supplies for Antsiranana, the capital city of Diana Region. The task was to restore, enhance and maintain productive landscapes for the provision of wood fuel and other broad public benefits.

A landscape approach is needed to enhance the sustainable management and rehabilitation of production capacities.

In 1996, GIZ initiated the German-Malagasy Environmental Programme. Its immediate target was to increase the percentage of sustainably produced charcoal through wood energy plantations to supply Antsiranana. Benefits for the rural poor were essential: 92% of Madagascans live below the poverty line (World Bank 2013), and only 11% of households have food security (FAO and WFP 2013). A heavy dependence on natural resources and an annual population growth rate of about 3% contrast with an average farm size of only 1.2 hectares (ha) per household and traditional production methods. Few farmers' yields allow them to sustain their family throughout the year (Üllenberg 2009).

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Increasing the productivity of landscapes through sustainable wood energy

Productive landscapes in Madagascar are characterized by a mosaic of land uses, mainly comprising agriculture (rice, manioc, maize), extensive cattle ranching and forests. Households in rural areas mostly use fuelwood for their domestic needs. In urban centres, fuelwood has been replaced by charcoal. To reduce the pressure on natural forests the sustainable capacity of landscapes to produce wood fuel needs to increase.

In order to identify and retain production capacity in both energy wood plantations and natural forests, the programme applied the best practices of sustainable forest management (SFM). The elementary requirement was that extraction rates, including woody biomass, must not exceed present growth rates. The programme proceeded in an integrated way:

- creation of new forest resources through reforestation of degraded landscapes with secure tenure rights;
- improvement of the entire wood fuel value chain; and
- establishing the conditions for an enabling framework.

The programme combined land rehabilitation with local economic development. It established interconnected socio-economic impacts (diversification of income and increase of the landscape's production capacity); and environmental impacts (fire reduction, rehabilitation of degraded land, reduction of pressure on natural forests). All activities were embedded in land-use planning at the regional and local level to support implementation at the landscape level.

Turning users to owners

One main focus was afforestation through allocating degraded land to individual households and granting long-term user rights. Patches of degraded communal land that are eligible for afforestation are converted into private property. A prerequisite was that the barren land, which is usually owned by communities, must not be suitable for other uses, such as farming. Since the approach requires the voluntary and proactive participation of communities it is called village-based individual reforestation (*Reboisement Villageois Individuel*, or RVI). It involves allocating land title to an individual person, combined with collective administration and capacity building, usually by a village afforestation body designed for this purpose. Management tasks such as preparatory steps (planning and management of the nursery, transportation of plants, etc.) are the responsibility of the afforestation body. This structure was perceived as an advantage by user groups.

The planned reforestation was subject to a consultation process involving the community council, community members and foresters in order to avoid land disputes and support consensus-based decisions. Individual reforestation sites are endorsed by a community council decision through a communal decree and allocated to interested households, along with defined user rights and obligations. Each plot is demarcated, mapped and documented. Technical assistance was provided by local NGOs throughout the process.

The reforestation sites are registered with the topographical services of the respective land office. Registration involves official verification of the site based on the sketch plan, communal decree and tenure plan. This provides an unprecedented level of tenure security in the country.

In addition to institutional and technical support, the substantial external input is mechanized soil preparation along contour lines, including breaking up compacted soil layers. Nursery operations are collectively organized; planting and maintenance are the land-owners' responsibility. Almost all plot owners (98%) reforested with *Eucalyptus camaldulensis*, although other species such as *Acacia auriculiformis* and *Acacia mangium* were available.

The investment cost for one ha of eucalyptus plantation amounts to €207, 66% of which is provided by technical assistance. The remainder comes in the form of labour by the land-owners.

On average, smallholder households involved in the scheme own three ha of wood fuel forest. It increases their income by about 40%. For many people the increase will be significantly higher, since about 30% of farming households are in the poorest and landless segment of the population.

The programme has also strengthened the economic position of women. By enrolling in the afforestation schemes women had more opportunities to own resources.

Value chain development

Most kilns used in Madagascar had a low rate of effectiveness (10–12%) and a high rate of waste. The programme's fast-growing plantations, managed with short rotation cycles, yield large quantities of wood. This supported the development of technologically advanced kilns that are more efficient and produce fewer emissions. Kilns developed by the project, such as the stationary GreenMad Dome Retort, have an efficiency rate of more than 30%, triple that of the old kilns. New kilns with methane recycling cut the carbonization time from 7 days to 72 hours and recycle flue gases that would be normally be emitted into the atmosphere. The internal rate of return of such an investment (€4,500/unit) exceeds 40%. And since the global warming potential of methane is 21 times that of CO_2, the technology yields significant CO2e reductions.

Modernizing the value chain in an integrated manner meant assisting both plantation owners and charcoal burners to organize themselves as groups of shareholders. Groups averaged 40 to 50 members. They gained market access by creating registered micro-enterprises to invest in and run the retort (microcredit services) and commercialize the product, including certified proof of origin. Each company's business plan is based on the exploitation plan of the respective plantation area (in general, about 300 to 400 ha per company). Companies pay duties to the commune and taxes to the region. In order to create a "green" value chain, some of the rural companies joined forces and established an

urban charcoal market in Antsiranana, thus facilitating the product's traceability and increasing transportation efficiency. This increased shareholders' economic returns by 30%.

Use of improved cook-stoves (ICSs) is also curbing wood fuel consumption in the city, which is the primary market for the RVI plantations. The challenge is to design an ICS that can be manufactured locally and be compatible with established cooking habits. The project intervened at all levels of the ICS value chain — from production to commercialization — by supporting private entrepreneurship and public relations activities. Today, a women's association promotes the use of improved stoves in local households. The association makes households aware of the environmental and health hazards associated with traditional stoves and the benefits of ICSs. Most of the ICS production sites and sales locations are run by women. To date, around 4,500 urban families (about 20% of all Antsirananan households) use ICSs with reduced charcoal consumption (89 kg/year instead of 125 kg/year).

Enabling framework conditions

The management of landscapes must be broad enough for far-reaching management visions but narrow enough to ensure the participation of all relevant stakeholders in decision making and planning (FAO 2012). A landscape approach should strive for a consensus on general development goals and challenges and on options and opportunities (Sayer et al. 2013).

GIZ facilitated an adapted Regional Modernization Strategy (Jorez, Richter and Sepp 2009) for the Diana Region by means of a multi-stakeholder process. It defines an approach for the wood fuel sector, including proposals for urgently needed regulatory measures by the forest service to curb the widespread and unregulated production of wood fuel from natural forests. An environmental coordination platform (*Organisation de la Société Civile pour l'Environnement dans la Région Diana*, or OSC-E/Diana), coordinates all stakeholders in the region. The members of the platform gather regularly to discuss progress and negotiate ways to overcome barriers.

GIZ also supported the elaboration of regional land-use plans (*Schéma Régional d'Aménagement du Territoire*, or SRAT) with a horizon of 20 years. A product of the multi-stakeholder process, these plans have a coherent vision for regional development (Republic of Madagascar 2012). They also assure the spatial coherence of plans of the various sectors involved (forestry, agriculture, nature conservation, infrastructure, urban planning, etc.) and thus guide the development of the landscape. The regional land-use plans acknowledge wood as an important future energy source, one that can decrease dependency on energy imports as long as livelihoods are sustained and environmental effects are managed. It is hoped that municipalities will take over and integrate wood

energy production in their plans at the local level. This is a key element for assuring long-term production perspectives for local land users.

Impacts on the forest landscape

Overall, 2,900 households afforested 8,000 ha of degraded land around 68 villages. Table 1 compares the traditional (business-as-usual) approach with the modernized value chain.[1]

Table 1. Efficiency gains through plantations and an improved value chain

Interventions	Metric	Traditional value chain (natural forests)	Modernized value chain (plantations)	Improvement coefficient
production	annual increment (m^3/ha)	2	6.5	3.25
conversion	efficiency	12%	30%	2.50
combustion	efficiency	19%	21.3%*	1.12
energy produced	megajoule (MJ)	958	8,722	Leverage factor: 9.11
sustainable supply	no. of persons	1.5	13.9	

Note: Assumptions: wood density: 700 kg/m3; energy content: wood 16 MJ, charcoal 30 MJ, * weighted average, as only 20% of the urban population use ICSs with a 28% efficiency rate. Source: authors' fieldwork.

Based on the annual increment and the efficiency gains, sustainable wood fuel production at a scale of 8,000 ha offsets the previously unregulated exploitation of more than 72,000 ha of natural forests under traditional production, both within and adjacent to protected areas.

Local biodiversity conservation in state-owned natural forests is an additional benefit. Another benefit is the prevention of bush fires in and around the afforestation zones, since the owners of the forest plots have a strong interest in protecting their property.

Within newly created energy forests many native and even endemic species were able to establish themselves on previously denuded surfaces under eucalyptus trees (Edmond 2013). The understorey vegetation — which includes grasses and bushes as well as the shallow root system of *Eucalyptus camaldulensis* — is very important in protecting the soil from erosion. This is important, since the plantations are situated on degraded and marginal land areas that are at risk of soil erosion.

Conclusions

Integrating the requirements of the ecosystem into development and land-use planning processes can deliver benefits to an extensive range of stakeholders. Afforestation and restoration of formerly degraded areas have for the time being reduced the pressure on neighbouring protected areas. By participating in a formalized value chain, rural wood fuel producers gained tangible benefits, such as increased income and diversification of livelihoods.

In addition to securing sustainable energy supplies, afforestation was reported to reduce resource conflict and therefore build social capital, which contributes to the success of resource management (Ostrom 1999; Ostrom, Gardner and Walker 2006) and climate change adaptation (Adger 2003). Local and regional authorities have based their land-use planning on the needs of the local land users, and support these social synergies. This is especially important in regions that are vulnerable to environmental threats and have ineffective legal frameworks (Economic Commission for Africa 2011).

The RVI approach is limited to barren land. It can supplement but not replace measures to promote transition towards SFM of all types of forests. With a growing demand for energy resources from growing populations, natural forests will eventually have to be included in SFM schemes.

The rehabilitation activities described here have the potential to be scaled up to other areas. They address the three pillars of sustainability: ecological suitability is ensured by rehabilitating formerly degraded land; and sustainable management has been proved to be economically viable and adapted to the social system as it diversifies local livelihoods and provides important income to reduce rural poverty.

Endnote

1. The relative improvement achieved at three principal stages (production, conversion and combustion) is shown as an improvement coefficient, resulting in an overall leverage factor of 9.1. With an average energy requirement of 625 MJ/pers./a, the traditional system can supply 1.5 persons sustainably; the modernized value chain can supply 13.9 persons.

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4.8 Landscape effects of supply chains

KATIE MINDERHOUD

Introduction

The goal of a landscape approach is sustainable resource management and benefits for all stakeholders. Given the number of actors who have a stake in implementing a landscape approach, it is crucial to have a clear understanding of what is expected of whom. The private sector is in a position to adopt sustainable business practices, but requires legislation and policies that are transparent and equitable. Such an enabling environment can change market dynamics.

The stakeholders involved in the supply chain and the nature of their relationships are different from those in the broader landscape. Various levels of governance affect these stakeholders and can support (or limit) coordinated resource management. Support — in terms of knowledge, service providers, infrastructure and institutional capacity — is the critical element in ensuring sustainable supply chains and productive landscapes.

Stakeholder relations

Both producers and end users of agricultural products benefit from secure access to resources and safe, high-quality produce of traceable origin. Supply chain actors depend on each other; relationships are based on clear expectations and agreed terms. Within the supply chain there are also issues of responsibility and assurance, but there are mechanisms by which these issues can be dealt with.

Sustainable practices in supply chains relate to the wider landscape.

In the landscape context, stakeholders are likely to compete over resources such as forest, land and water, especially when the use of resources by one person or group negatively affects another. A landscape is more than a physical space; it involves a variety of actors and their impacts on each other and on the environment. Unlike the supply chain context, there is not necessarily a shared goal or process by which these actors interact. Only when the landscape and its sustainable use and management are perceived as the shared responsibility of everyone involved can there be a coordinated effort "… to achieve social, economic,

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and environmental objectives in areas where agriculture, mining and other productive land uses compete with environmental and biodiversity goals" (Sayer et al. 2013: 1).

Governance: shaping markets and landscapes

Governance, as defined by Bevir (2013), refers to all processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organization or territory and whether through laws, norms, power or language. At a country level, the state government provides legislation with respect to natural resource use and policy for socio-economic development, which together form a governance framework for individuals and organizations. The degree of centralization in a country determines the actual actors and their authority and responsibility; these vary from federal- and state-level government down to the municipal and community level.

In addition to government, global market and private-sector governance is determined by a combination of national and international regulations and by voluntary sustainability standards for compliance with criteria to ensure quality and sustainability.[1] Companies have an incentive to commit to such schemes in order to get access to preferred markets and position themselves as frontrunners in their sector. For companies, or the sector at large, voluntary standard initiatives are a way to improve business performance and limit negative social and environmental effects. Some efforts go beyond legal compliance, for example, with a commitment to zero deforestation after an agreed cut-off date.

Despite the structures provided by government and markets, it is still challenging to implement and enforce laws to meet set criteria of good practice. Weak land administration and a lack of law enforcement show how government capacity at the level of implementation could fall short. For the private sector, this situation poses risks as well as opportunities. It is hard to comply with laws and standards due to a lack of functioning procedures, but at the same time this absence of control may allow them a free rein in their operations. Governance gaps result in situations where the responsibilities of government and market parties to regulate and control negative impacts in the landscape are unclear.

Private sector: impact and responsibility

Companies have a direct responsibility for their supply chain and sourcing area to comply with legal requirements. They also have to assess their impacts on society and the environment. The UN Principles on Business and Human Rights, also known as the Ruggie Principles, clearly define the responsibility of the private sector.[2]

The Ruggie framework has three pillars:

- the duty of the state to protect against human rights abuses by third parties, including business enterprises, through appropriate policies and regulation;
- the responsibility of private sector to respect human rights. This means that business enterprises should act with due diligence to avoid infringing on rights of others and to address adverse impacts associated with their activities; and
- greater access to effective remedies, both judicial and non-judicial.

The Ruggie Principles emphasize that responsible business practices clearly have to be part of the social and governmental context in order to succeed and make positive contributions to society. The following two case studies[3] show the interdependency between responsible business from the supply chain perspective and good governance at a landscape level.

Case study 1: Plantation company in tropical rainforest landscape

A large-scale plantation company in a tropical rainforest landscape set high sustainability standards for its own operations as well as for its associated outgrowers and smallholders. The first challenge was to ensure legal compliance, not only for the company; land administration and environmental licences are required for all suppliers. Beyond legal compliance, the aim is to achieve compliance with the leading commodity standard, carrying out good agricultural practices and meeting additional social requirements in terms of housing and facilities for staff and workers. Solidaridad supported the company with technical training for certification of smallholders in particular.

Landscape context

In the forest landscape where the company is located there are many high conservation values to consider, such as a rich variety in vegetation and species, riparian strips and protected waterways, as well as high carbon forest stock. The state authority is responsible for ensuring that resource use complies with law and environmental protection measures. The area has a relatively low population density. Economic activity is based on mineral extraction and to lesser extent on agriculture, livestock farming and industry. Despite some economic growth in the region, there is major social, economic and environmental imbalance and living conditions are difficult. Expanding industry, agriculture and rural settlements have major environmental impacts, including deforestation and land degradation.

Agricultural expansion and markets

Other companies have begun operations in the landscape over the past decade. The area of land used for agricultural production has increased in response to growing domestic demand for consumer products and biodiesel. While front-runners follow leading standards in their sector, other producers carry on business as usual, without providing assurance that basic social and environmental requirements are met. On the market side there is a similar disparity in sustainability performance: some international brands demand certified produce to meet their sourcing requirements and commit to zero deforestation, while the majority of market players purchase commodities with no questions asked about origin or practices.

Market demand drives sector growth and provides opportunities for employment and investment in the region, but companies are not required to meet any standards for

sustainable production. As a result, companies with the highest standards must compete with companies that operate with lower environmental and production standards. Instead of careful land-use planning, based on the suitability of soil and the availability of arable land, new companies plant in secondary forest and on land that has been burned. In addition to environmental damage, these practices bring risks for the individual producers who are under contract to the larger companies. If their planting does not yield sufficiently due to these challenging circumstances, they will not be able to pay back their loans.

Impact and influence of the private sector on the wider landscape

Within the scope of its operations, the case study company takes full responsibility for legal compliance and good social and environmental practices. Its agricultural practices ensure efficient resource use by applying agricultural inputs in a timely and moderate manner. Integrated pest management and well-planned replanting and harvesting contribute to high productivity and to limited environmental impacts on soil, water and biodiversity. From a social perspective, the company provides jobs by hiring employees from local communities. For smallholders who become suppliers to the company the new source of livelihood brings an alternative to traditional slash-and-burn practices; this saves approximately five ha of land per farmer per year.

Moreover, the company is committed to support its suppliers; it works with outgrowers and smallholders to achieve sustainable practices and full compliance with social and environmental legislation, as required under the commodity standard. The company took the lead in collaborating with the municipal and state government and the local bank to provide the necessary capacity and financial support. This included assisting producers to acquire an environmental licence from the municipality and ensuring the required set-aside of forest in compliance with environmental law. These efforts contribute to the protection of forests, riparian strips and biodiversity hotspots in the area.

Despite these efforts, there are limits to the influence of private-sector actors in the landscape context. In order to stay in line with the commodity standard and the deforestation cut-off date the company had to carefully screen smallholders against criteria that might negatively affect future certification. Past practices of smallholders — such as clearing of land, deforestation, burning, and lack of land titles and permits — were critical issues that could become a liability to the company. This meant that only a limited number of the smallholders who applied could participate. In this way, improvements to supply chain performance can result in the exclusion of underperformers. It remains an open question who else, besides the company, should then support small-scale farmers to improve their livelihoods and protect the environment.

An even higher risk for the production landscape comes from the operations of those companies that show no concern for sustainability while scaling up their impacts. This has resulted in deforestation and illegitimate expansion, despite existing environmental legislation and land-zoning policy. This situation also affects the frontrunner position of the case study company, since it is confronted with unequal circumstances and fierce competition. Failure to enforce the law allows these developments to take place.

Case study 2: Agricultural production bordering a national park

Solidaridad has supported a number of producer organizations to adopt more sustainable practices in soy production. The aim was to increase the production of soy by family farmers and introduce more sustainable practices, with lower impacts on the environment. The project started by bringing together 900 producers of non-genetically modified (GM) and organic soy, who agreed to participate in the process of Round Table on Responsible Soy certification. Financial support was provided by end market users in the Netherlands. Municipalities, government agricultural extension services and producer organizations, who all contribute to outreach to farmers, were involved in the project.

Landscape context

The project engaged farmers in the municipalities bordering a national park, a biodiversity-rich area that includes the protected waterways of the region's major river. The use of pesticide in the area was identified as a major issue; it posed a threat to the environment and to local organic crop production. After GM soy was legally allowed in 2006, organic farmers were confronted with an increase in GM soy production and in pesticide use. Both the organic trade company and producer organizations in the area wanted to respond to these developments and emphasize the strategic importance and environmental value of non-GM and organic production.

Soy sector development

Several changes in recent years have affected soy production in the region. Since 2006, many family farmers shifted from conventional and organic soy to GM soy production. This is partly because of rising market pressure, and partly to avert the risk of contamination from GM crops. The demand for soy for biodiesel increased as a result of a state programme to support family farmers; it offered a price premium for soy without any requirements on how it was produced. Neither government nor the market set minimum standards for sustainable agricultural practices among family farmers. This has made it increasingly difficult to engage farmers in the project and improve their environmental performance. If these farmers were provided with support in professional skills development, they could benefit hugely from improved farm management, both in terms of livelihoods and in sustainable resource use.

Impact and influence of producers on the wider landscape

It became clear during the project that technical support was helping organic and conventional producers make on-farm improvements. The use of pesticides was significantly reduced. As a result of training in agricultural practices, farmers became better informed about the correct use of pesticides, protection measures in the field and safe storage. With this knowledge, they are better able to make informed decisions on

their use of inputs. The planning of crop rotation and land management also improved. Erosion, caused by the heavy rains in the region, has been tackled by flattening slopes and creating grooves and terraces to prevent run-off and increase infiltration.

Although farmers contributed to more sustainable management of the landscape, their participation is vulnerable to external forces. The number of farmers involved in the project dropped from 900 in 2009 to 400 in 2012, as many of them switched to GM soy production. By 2013, only 200 farmers were still involved, with an average farmed area of 15 ha each, producing up to 9,000 tonnes of certified soy from a total 3,000 ha.

The project was valued by those involved, with good participation and uptake in best practices, but the interventions could not compete with economically attractive GM soy and biodiesel premiums. Technical assistance and services, including inputs and credit, are commercially oriented and aggressively promote GM soy production. This raises both social and environmental concerns. There is a need for technical assistance to provide farmers with information about decision-making at the farm level. There is potential for individual producers to contribute to well-managed production landscapes, but if efforts are not coordinated in a cohesive way or supported by policy, market and institutional capacity in outreach to farmers, they cannot reach the desired effect in scale and impact.

Conclusions

Solidaridad is exploring opportunities to test landscape-modeling tools and interventions in ongoing farmer support projects to build on the positive impact of on-farm interventions and to start to address those issues that go beyond the farm level and company supply chain. This entails strategic engagement with local government, an understanding of policy implications at various levels and stakeholder dialogues between people who until now have not worked together.

Such dialogues bring forward a variety of perspectives and needs, and also help identify shared issues and possible solutions. This type of exchange, with input from research and information technology, also spurs new ways to overcome institutional barriers and address weak spots in governance. Responsibilities can be reassigned; for example, by training local community patrol groups in the use of mobile GPS devices to increase control in protected areas, or by building on the work of farmer organizations as service providers and policy advisors. Such collaboration and exchange of information provides direct feedback from the field on policy implications and future policy development.

Author note

The views presented in this article are the personal opinions of the author.

Endnotes

1. Initiatives include the Round Table on Sustainable Palm Oil (RSPO) and Round Table on Responsible Soy (RTRS).
2. See Human Rights Council: Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework (2011). Source: www.business-humanrights.org/media/documents/ruggie/ruggie-guiding-principles-21-mar-2011.pdf.
3. Case study examples are based on the experiences that Solidaridad gained in project collaboration with private-sector partners over the past years in various countries. In consideration of ongoing activities, company details and locations have been omitted.

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4.9 Increasing local capacities in rural Panama

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The Republic of Panama contains high levels of biodiversity due to its geological history and geographic location. With only 77,082 km^2 of land, Panama contains 10,400 species of vascular plants, 259 mammal species and 957 bird species (Holdridge 1971; ANAM 2006).

The country's diverse forests were estimated in 2010 to cover approximately 3.4 million hectares (ha) — 45% of total land area — but the country lost more than 30% of its forest cover from 1950 to 2000 (ANAM 2008; FAO 2010). The deforestation rate has slowed since 2000 due to increased enforcement of environmental laws, and to efforts to reforest and regenerate secondary forests (Wright and Samaniego 2008). Forests continue to be degraded by unsustainable land-use practices, however. According to the World Bank (2014), only 7.4% of Panama's surface area is suitable for crops and livestock, but more than 30% is dedicated to agricultural production. Agricultural expansion continues to be a primary driver of deforestation in Panama (Mozejko 2009; Peterson St-Laurent, Gelinas and Potvin 2013).

Silvopastoral systems at the farm and landscape level improve productive capacity and ecological integrity.

The emergence of cattle ranching

Cattle ranching in Panama began in the early 16th century with the arrival of the Spanish colonists. During the 20th century, agriculture expanded into wetter regions of the country (Connelly and Shapiro 2006).

Cattle ranching has been incentivized by the country's Agrarian Code. It grants all unoccupied territory owned by the state, including forests, to those who convert the land to productive uses (Connelly and Shapiro 2006; Peterson St-Laurent, Gelinas and Potvin 2013). International development agencies, such as the World Bank and the Inter-American Development Bank, have invested millions of dollars in Panama over the past

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several decades to promote cattle ranching (World Bank 1973; IDB 2014). The country's primary lenders also grant credit to farmers to establish cattle pastures (Mozejko 2009). Some speculate that local banks view cattle ranching as being able to yield profits even during drought years, when farmers can lose 100% of their crops (Ariosto 2009; Wright and Samaniego 2008). Generally speaking, government incentives in Panama promote foreign investment and economic development at the expense of natural resources (Mozejko 2009). The country is a critical link in global trade via the Panama Canal.

By the late 1990s, the Azuero Peninsula was an agricultural mosaic of deforested land used for agriculture and cattle ranching, with forest patches and trees scattered throughout the landscape. Research shows, however, that the farmers who deforested the region also protect native forests and plant native trees in their pastures; their reasons include providing food and shade for cattle and restoring ecosystem services (Garen et al. 2009; 2011).

Although cattle ranching generates significantly less revenue than agriculture, the practice is deeply ingrained in Panamanian culture and is a central component of rural livelihoods (Heckadon-Moreno 1984, 1997; Wright and Samaniego 2008). According to Heckadon-Moreno (1984, 1997), this is because cattle are less vulnerable to pests and drought and can be sold when cash is needed. Cattle are also a low-cost investment, since they can feed on grass and require minimal care (Connelly and Shapiro 1996). Although labour costs have recently doubled in the Azuero Peninsula due to tourism development, cattle pasture can be easily managed with fire and cheap, accessible agrochemicals.

Alternatives: silvopastoral systems

As is common throughout Latin America, cattle farmers in Panama cut and burn trees to plant exotic aggressive grasses, which they manage by annual burning and extensive applications of herbicides. Grazing pastures are perpetually overgrazed due to a lack of rotations. The environmental impacts of these practices include loss of biodiversity and soil carbon, decline in soil fertility, soil erosion and compaction, reduced water infiltration and regulation capacity and watershed contamination (Steinfeld et al. 2006). Stocking rates are lower than one animal per ha (Connelly and Shapiro 2006).

These consequences are particularly severe in the dry forest ecosystem of the Azuero Peninsula. With an annual rainfall range of 1,054–1,678 mm and a dry season lasting five to six months, the region's extreme climate variations compound the stresses of unsustainable land-use practices and challenge efforts to restore the ecosystem (ANAM 2004; Wishnie et al. 2007). As the climate continues to change, vulnerability in the region increases.

Advances in ecological restoration knowledge have led to strategies to restore tropical forests and native tree cover, including native species reforestation and agroforestry.

Such strategies have the potential to reverse these trends (Chazdon 2008; Chazdon et al. 2009; Lamb, Erskine and Parrotta 2005). Silvopastoral systems (SPSs), which combine trees, forage shrubs and grasses with livestock production, can increase biodiversity and ecological integrity while complementing traditional livelihood practices (Palmer 2014). SPS can improve on-farm productivity by increasing edible biomass, producing timber and non-timber forest products and diversifying production systems (Murgueitio et al. 2011). Intensive silvo-pastoral systems (ISSs), which integrate a high density of fodder shrubs with timber species, short grazing periods and lengthy pasture recovery times, can deliver even greater productivity benefits (Murgueitio and Solorio 2008).

At a landscape scale, SPSs can increase the diversity of shrub and tree species through the establishment of living fences and wood lots, protection of riparian zones and integration of trees in pastures, which can promote higher levels of biodiversity and connectivity between remnant forest patches (Harvey et al. 2005; Murgueitio et al. 2011).

Increased vegetation cover also improves the provision and regulation of ecosystem services. SPSs can decrease soil erosion, improve nutrient cycling, enhance soil fertility, reduce watershed contamination, improve hydrological cycling and increase carbon sequestration, crop pollination and pest management, all of which are vital to ecosystem services (Chazdon et al. 2009; Calle, Montagnini and Zuluaga 2010; Murgueitio et al. 2011).

SPSs are virtually absent from the Panamanian landscape. There are three primary reasons for this:

- The government provides no incentives for SPSs, which require substantial up-front investments in labour and materials. Although legislation passed in November 2013 promised an 85% reimbursement for investments in the cattle ranching sector, including SPSs, the program remains unfunded (Diaz 2013).
- Farmers in the region are not familiar with SPSs and most agricultural extension workers have no training beyond conventional practices. Furthermore, there is little capacity to propagate and cultivate the native tree species utilized in SPSs — more than 75% of Panama's reforestation efforts in the past decade have focused exclusively on exotic tree species (Wishnie et al. 2007).
- Many farmers prefer not to have trees on their farms, believing that they shade out grasses and compete for scarce water supplies.

The adoption of SPSs at a landscape scale requires a strategy that demonstrates to land-holders how the system can increase on-farm productivity and resilience. Only when farmers appreciate the productive advantages of SPSs will they be likely to adopt them. Successful on-farm examples can encourage farmers to work together to seek funding and pressure government agencies for technical assistance. This is particularly relevant in the

Azuero Peninsula, where SPSs could deliver profound increases in farm productivity during the dry season.

A new approach to landscape restoration

Recent advances in research and practice related to SPSs have failed to reach the people who make land-use decisions in Panama. To address this gap, the Environmental Leadership and Training Initiative (ELTI)[1] provides capacity-building opportunities and leadership support to land-holders, extension agents, local authorities, policy-makers and business leaders, who make decisions about land use in multiple-use, human-modified landscapes. ELTI's goal is to conserve and restore tropical forests and native tree cover using strategies that respond to the local needs and realities of landholders. ELTI also offers financial assistance for professional development and mentoring and technical assistance to develop and implement local projects.

In 2009, ELTI implemented a field course in the Azuero Peninsula for land-holders and environmental authorities on native species reforestation, agroforestry and SPSs. The course was inspired by an analysis of native tree planting and protecting practices in the region (Garen et al. 2009; 2011), which revealed that the majority of landholders were interested in learning about agroforestry and SPSs. ELTI coordinated a four-day field trip to visit SPS model farms that had been established with technical assistance from Colombia's Center for Research in Sustainable Agricultural Production Systems (CIPAV). The primary goal of the field trip was to facilitate farmer-to-farmer interactions about experiences with SPSs.

As a result, several farmers decided to test SPSs as an alternative to their conventional practices. ELTI linked the farmers to the Global Environment Facility's (GEF's) Small Grants Program (SGP), which was interested in supporting SPSs in the Azuero region, and helped the farmers establish a legally recognized association (as required by the SGP). Once established, the Association of Livestock and Agro-Silvopastoral Producers of Pedasí (*Asociación de Productores Pecuarios y Agrosilvopastoriles de Pedasí*, or APASPE) developed a grant proposal with the support from ELTI and CIPAV. In 2010, APASPE received funding to implement the first SPS demonstration farms in the region. Despite initial issues with fund management and starting a new group, the APASPE members enjoyed many successes. They received more funding to establish additional SPSs and other sustainable farming activities.

During the programme's second phase (2014–16), APASPE's goal is to transform conventional farming practices into more environmentally sustainable systems with multiple functions in order to increase farm productivity and restore watersheds and water resources. After only three years, two of the APASPE model farms have shown significant increases in overall forage biomass for cattle, forage production throughout the dry season and milk production (30% increase).

Although it is too early to tell what APASPE's impacts will be at the landscape scale, their initial success is inspiring other landholders to explore SPSs and other conservation and restoration activities. APASPE's SPS initiative will be scaled up from five ha of SPSs on two farms to more than 80 ha on 20 farms. Moreover, APASPE members have hosted more than 500 visitors on their model farms, advised two farmer cooperatives in the preparation of SPS funding proposals and shared their experiences in 25 public forums. If provided with adequate support, these efforts could lead to a growing number of landholders working together at the landscape level for conservation and sustainable agriculture goals.

Conclusions

Despite significant scientific advances in ecological restoration in the context of agricultural landscapes, unsustainable land-use practices continue to cause severe environmental degradation throughout Panama. Conventional cattle ranching threatens the ecological integrity of the Azuero Peninsula and the rural livelihoods of the local people; this will only worsen with climate change. SPSs can help address both ecological integrity and human well-being, but socio-political, economic and cultural factors in Panama have prevented it from being adopted. Addressing these issues will require financial incentives, training in SPS and long-term leadership support for land-holders. Investing time and resources in organizing and developing community groups is one way to help accomplish these goals. It is hoped that APASPE will continue to consolidate this alternative model, eventually linking with other local and national policy processes.

Lessons learned

Building the technical and leadership capacity of community organizations and land-holders, especially when government assistance and interventions for restoration are lacking, can help to initiate and scale up initiatives that restore ecological integrity and improve human well-being within agricultural landscapes.

A range of different activities can contribute to forest restoration and increased native tree cover in multiple-use, human-modified landscapes in the tropics. Restoration projects and programmes with local communities and landholders must therefore address local needs and interests and build on traditional knowledge and practice.

Emerging community-based organizations may require frequent support during the initial stages of development. Issues that seem trivial can morph into larger problems and can break groups apart. The presence of an on-site practitioner who understands the local culture and can provide context-specific technical and leadership assistance can be instrumental to the success of a project during its initial stages.

A training-of-trainers model that is integrated with capacity and leadership training at the local level can help to develop community-level environmental leaders. They can lead efforts to scale up landscape restoration initiatives such as SPSs by communicating best practices to other land-use decision makers.

Endnote

1. ELTI is a programme of the Yale School of Forestry and Environmental Studies (F&ES) in collaboration with the Smithsonian Tropical Research Institute (STRI).

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4.10 Ecological restoration in the Atlantic rainforest, Brazil

POLLYANA BORN and FERNANDO CAMPOS

Serra da Esperança, Paraná, Brazil

The Serra da Esperança Environmental Protection Area (EPA) is located in the south-central region of Paraná State (Figure 1). The region has one of the most important Araucária forest remnants in Brazil and is considered a conservation priority by the Brazilian Ministry of Environment. EPAs are a type of Protected Area (PA) under the framework of the country's national system of protected areas.[1] The legislation establishes two kinds of PAs: Integral Conservation; and Sustainable Use. An EPA is considered a PA of Sustainable Use and its objective is to protect biodiversity, support effective land use and assure the sustainable use of natural resources.[2]

The region has a large number of smallholder farmers. Most of them earn their livelihoods from crop cultivation, such as corn, beans and green vegetables, and from dairy cattle. Forests are also an important part of farmers' lives, providing wood, yerba mate (*Ilex paraguariensis*, a kind of tea) and other non-timber products such as araucaria nuts. For many decades, Araucária forests have been exploited in an uncontrolled way; the harvesting of high-value timber, such as *imbuia* (*Ocotea porosa*) and araucaria *(Araucaria angustifolia)* has led to forest degradation.
Extensive agriculture was the main driver of deforestation in the region: today, less than 8% of the Araucária forest original area remains (de Britez 2007). Some places also face low water quality and water scarcity.

Restoring areas in small properties to recover forest landscapes demands a large investment in financial resources and time.

The Cultivating Hope project was established to restore riparian forests in smallholder farms, which represent most of the rural land properties in Paraná. Ecological restoration of riparian forests was a need identified in the planning and implementation of the Serra da Esperança EPA, which includes all properties in the area, both private and public. The main purpose of the project is to restore 95 hectares (ha) of Araucária forest. The costs of ecological restoration, such as tree planting and

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constructing fences in order to protect forests, are normally too high for smallholder farmers to afford.

Figure 1. Serra da Esperança Environmental Protection Area

The organization responsible for carrying out the project is the Brazilian environmental non-governmental organization, Mater Natura. Founded in Curitiba in 1983, its mission is to contribute to the conservation of cultural and biological diversity in order to support livelihoods. Mater Natura develops social and environmental projects, with financial support from various governmental and private institutions. In 30 years, it has established more than 50 partnerships.[3] Mater Natura has been engaged in sustainable development initiatives in the region since 2005.

The approach

Three rural communities, in Guarapuava and Inácio Martins municipalities, were selected for the project: Rosa, Monte Alvão and Rio Pequeno. The three communities are located in the Jordão River watershed, Paraná state. The communities were chosen primarily for their interest in restoring riparian forests. In Rosa, some landowners face water supply problems and, in Monte Alvão and Rio Pequeno, there is a great interest in the sustainable harvesting of yerba mate.

Rosa settlement was established in 2001 as part of Brazilian land reform politics and farm size there averages 10 ha. Most farmers make a living from cattle ranching and crops, but many of them also take part in activities not related to agriculture, such as bricklaying, domestic work and trading. In Monte Alvão, families have been living on the land for decades, traditionally making their livelihoods from family farms, cattle ranching and yerba mate, and occasionally working for local logging companies. Monte Alvão has the largest properties in the project; they average 15 ha. In Rio Pequeno properties are smaller and generally not used for agricultural purposes because of proximity to the city

(less than two kilometres). Most people work in the city and many farms in the community are used for recreation. All three communities shelter important water sources that either feed watersheds used for cities' water supply (Jordão River) or hydro-electric power (Areia River).

Initially, the main reason that land-owners participated in the project was the possibility of support for the changes required by Brazil's Forest Code.[4] This code required every land-owner to protect a 30-metre belt of forest along riverbanks and 50 metres around water sources. For many property owners, this was a hard obligation to fulfill, due to intensive economic use and the difficulty of practising sustainable agriculture in the remaining areas.

In 2012, the Forest Code was replaced by the Forest Law, which reduced the riparian forest belt to five- to eight-metres wide, depending on land size, for smallholder farms. Many specialists agree that such a small area is not enough to protect biodiversity or the quality of rivers and other water sources (Metzger 2010). The new circumstances made the project team re-evaluate the initiative's methodology.

Given the changes to the Forest Code, the project faced great insecurity about land-owners' participation. Consequently, a wide range of partners and stakeholders were included in the project's development. The state governmental environmental institution guided the team on land-owners' concerns about riparian forest width, and local associations helped to maintain farmers' interest.

Riparian forest restoration must allow for the fact that land use in smallholdings is intense: almost the whole area has some economic use, whether for crop cultivation, sustainable forest management or agroforestry. (In contrast, larger properties provide more options for biodiversity conservation or restoration.) Even though many fragments of forest remain in the smallholdings, their conservation status is usually poor, and they require restoration. In order to succeed, projects must take into consideration that it is economically difficult for smallholder farmers to set aside part of their land for the sake of environmental conservation. Alternative approaches to forest restoration must integrate methods of sustainable use of the landscape in order to encourage smallholder and family farmers to observe the forest law. Furthermore, to protect or restore areas larger than those required by law, it is crucial to balance biodiversity enhancement with economic use of lands. Indeed, this has been becoming one of the main purposes of Cultivating Hope.

However, one of the main goals of an EPA such as Serra da Esperança is to promote sustainable use of natural resources through land-use planning. Conventional agricultural practices — for instance, pesticide or herbicide application and chemical fertilization — are permitted only under strict conditions or even forbidden. A number of environmental constraints are described in the EPA management plan.

For this reason, sustainable agricultural methods such as organic farming have been developed for arable land alongside the restoration areas. Organic agriculture is less harmful to the environment and the absence of agrochemicals enhances biodiversity, which may also contribute to the major objective of the project: ecological restoration of the area. Although organic agriculture may have lower yields, operational costs decrease and market prices are higher (around 30%) for organic produce than for conventional agriculture. These factors make many farmers consider organic agriculture a credible alternative.

Both riparian forests and forest fragments in the project region are commonly used for the extraction of yerba mate leaf.[5] Lately, the product has developed an export market in the United States, which has increased its price. However, the U.S. market mostly demands certified organic yerba mate, whether it is planted or extracted sustainably from forests. Under traditional management, yerba mate trees grow inside the forest, which enhances leaf quality and, subsequently, market value. The production can be certified as organic under Brazilian legislation. All in all, this makes yerba mate a valuable part of restoration efforts in the region.

Project implementation

In April 2012, the project's objectives and methods were presented to the three communities. The total number of participants was 80 smallholder farmers. They wanted to participate due to their interest in water conservation, yerba mate cultivation and fence-building. Land-owners were informed early on about the minimum restoration requirement of 15 metres of riparian forest; this was up to three times the area demanded by the existing legislation. Despite this requirement, few land-owners quit the project. Furthermore, restoration of larger areas has brought new economic opportunities for land-owners, including participation in payment for environmental services schemes and climate change-related programmes.

The next step was interviewing interested farmers and acquiring relevant information about family income, history of land occupation, motivation to restore riparian forests, and other topics. Environmental aspects, such as occurrence of threatened species, forest composition, forest connectivity, biodiversity conservation status and soil degradation, were assessed. This was essential to develop a land-use map of the project small-holdings. Based on this information, the project team decided to use three methods of forest restoration:

- plantation establishment in areas that were completely deforested;
- forest enrichment in areas with remaining forests; and
- isolation through the building of fences in areas not used for economic purposes for forests that were able to recover after invasive cattle were excluded. Almost every land property has cattle, and isolating the forest from cattle demanded a huge investment in fences.

In the first method, yerba mate was used in 20% of the area; the remaining 80% was planted with other native species. Since the five metres of riparian forest along the riverbank were fully protected, no economic species were planted there. Yerba mate trees were concentrated in the remaining ten metres of the restoration zone.

Labour for restoration was recruited from the communities participating in the project. Local farmers already had knowledge of fieldwork such as fence building and planting. They were trained in the scientific aspects of restoration, such as the original features of the Araucária forest, ecosystem fragmentation and seedling production.

In addition to the sustainable management of organic yerba mate, organic farming has been introduced in the project properties. Since early 2014, Paraná's Technological Institute has supported this activity. Under the framework of the state's Programme of Organic Products Certification, smallholder farmers obtain free technical assistance with and certification for organic agriculture. Certification processes are still being developed and no participant has certified production yet. However, organic farming has already brought benefits to farmers and consumers from avoidance of pesticides and herbicides, and from biodiversity enhancement.

Lessons learned

Restoring areas in small properties to recover forest landscapes demands a large investment in financial resources and time. The practice of fencing adds to project costs and will increase as the number of participating properties increases. The diversity of people and environments involved requires extensive knowledge of the region and flexi-bility in decision-making processes. In order to achieve conservation objectives, a wide range of alternatives for restoration is needed. In addition, a significant number of smallholder farmers should be involved to ensure that the restoration of many small areas will bring big changes to the landscape mosaic.

To prevent smallholder farmers from going back to their old practices and consequently hindering restoration efforts, the project must carry out detailed land-use planning and develop activities that bring economic returns. Short-term projects such as Cultivating Hope emphasize production systems that farmers already know, in this case yerba mate sustainable production. This reduces the need for training and technical assistance and therefore reduces costs. On the other hand, such an approach restricts the possibilities of implementing a wider variety of sustainable production systems, which might bring benefits for environmental and economic diversity. A long-term perspective should involve additional partners for implementing a range of sustainable systems and providing support to the farmers to manage them.

It is worth noting that monitoring of restored areas is also essential for such sustainable systems to fulfill their ecological and economical potential (PACTO 2010). However, since monitoring is expensive, few initiatives continue to monitor in the medium and long term. Although the government has a legal obligation to protect the remaining Araucária forest, it is widely known for its ineffectiveness. In addition, frequent changes in public policies hinder the operations of the departments that are responsible for the various components of the landscape.

Cultivating Hope's team hopes to get support for monitoring restored areas over a longer period of time in order to show results in the ecological and economical aspects at the landscape level. Organic certification of yerba mate will be a vital part of this effort. The certification process requires a management plan of the property, which must include extraction techniques with a minimal impact on native forest, as well as local-level monitoring of the forest ecosystems.

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Endnotes

1. See Law 9.985/2000.
2. See Law 9.985, Article 15, 2000.
3. More information is available at www.maternatura.org.br.
4. Law 4.771, from 1965, is the former Brazilian Forest Code. The current Forest Law is Law 12.651, from 2012.
5. Yerba mate is a native tree from the Araucária forest. Its leaves are generally toasted and used in soft drinks and cosmetics.

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Section 5

Cross-cutting issues

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5.1 Incentive-based mechanisms in landscapes, Peru

KEDAR MANKAD

Integrated landscape management

Integrated landscape management (ILM) refers to long-term collaboration among various groups of land managers and stakeholders to achieve multiple objectives. These objectives typically include agricultural production; provision of ecosystem services (such as water flow regulation and quality, pollination, climate change adaptation, reducing forest degradation, and cultural values); protection of biodiversity, landscape beauty, identity and recreation value; and local livelihoods, human health and well-being benefits. Stakeholders seek to solve shared problems or capitalize on new opportunities that reduce trade-offs and strengthen synergies (Scherr, Shames and Friedman 2013).

Using markets to achieve these diverse sets of objectives and institutional requirements is one of the key tenets of the landscape approach. Market and financial incentives can create the enabling conditions for landscape-scale impacts.

Financial incentives to meet multiple landscape objectives

Rural populations in most of the developing world rely on agriculture for their livelihoods, either directly or indirectly. In agricultural landscapes across the globe, these populations are increasingly recognized as the primary stewards of environmental quality. Landscape stakeholders pursue numerous strategies for the various parts of the landscape mosaic (McNeely and Scherr 2003).

Managing the underlying financial incentives can make integrated landscape approaches sustainable.

In areas of high agricultural production, they can minimize agricultural waste and pollution; manage resources in ways that conserve water, soils, and wild flora and fauna; and use crop, grass and tree combinations to mimic the ecological structure and function of natural habitats.

In areas managed for other ecosystem benefits, they can minimize or reverse the conversion of natural areas; protect and expand larger patches of high-quality natural habitat; and develop effective ecological networks and corridors.

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Many barriers constrain producers from adopting these practices:

- for individual farmers or operations, degrading practices may be more profitable in the short term, financial resources may be inadequate to make the transition, or land managers and businesses may lack technical expertise;
- at the community, landscape or market level, barriers include the need for collective action by a range of stakeholders, weak connections between land managers and beneficiaries of good practices, insecure tenure, weak market demand, and cultural or social impediments; and
- at all levels, a hierarchy of barriers needs to be analyzed in order to define intermediate goals of action. Actions at the local level may not succeed as long as major economic and policy drivers continue to encourage degrading practices.

Policy and regulatory approaches are a major component when overcoming barriers. In many situations the underlying financial incentives for land users need to change in order to achieve positive outcomes for people, food and the environment.

The mechanisms discussed here encourage one or more of these management strategies to ensure livelihoods and the resource rights of stakeholders. Some mechanisms, including third-party certification standards such as the Sustainable Agriculture Network (SAN), have principles and criteria that try to address all of these strategies, although they focus on agricultural production. Others, such as certain types of conservation agreements, may simply incentivize protection of larger patches of high-quality natural habitat or minimize conversion of native forests. Landscape decision-makers will have to combine mechanisms, depending on what they need to address and the capacity of stakeholders to implement these actions.

Categories of market and incentive-based mechanisms

Landscape decision makers, whether individual actors or those with a mandate to steer development at a landscape scale, can consider a range of needs and opportunities in using specific mechanisms. In general, three categories of mechanisms can be used to support ILM and associated outcomes.

Financing

Financing is intended to encourage land managers and agricultural producers/processors to shift to or sustain sustainable management practices or make investments to increase sustainability. One example is short-term credit, where a public or private bank, investment fund or private company offers credit for working capital for sustainable practices. Other examples include long-term soft loans[1] for land-owners or companies, impact investment, and public taxes and subsidies.

Ecosystem service payments

These link two main stakeholders: buyers (or the collective interests of local, regional and global communities) and sellers (predominantly farmers and other land stewards). Payments are made to preserve or enhance watershed functions, biodiversity or carbon

sequestration and emissions reductions. They can also be in the form of conservation easements, whereby a land trust or government body pays private land-owners not to develop on natural areas of land, waterway or forest.

Product markets

These are varied initiatives that share one main feature: the provision of goods and services that are produced in ways that support environmental, social and production objectives. Examples are eco-certification, landscape labelling and ecotourism. Buyers are generally consumers who pay price premiums for compliance with certain standards.

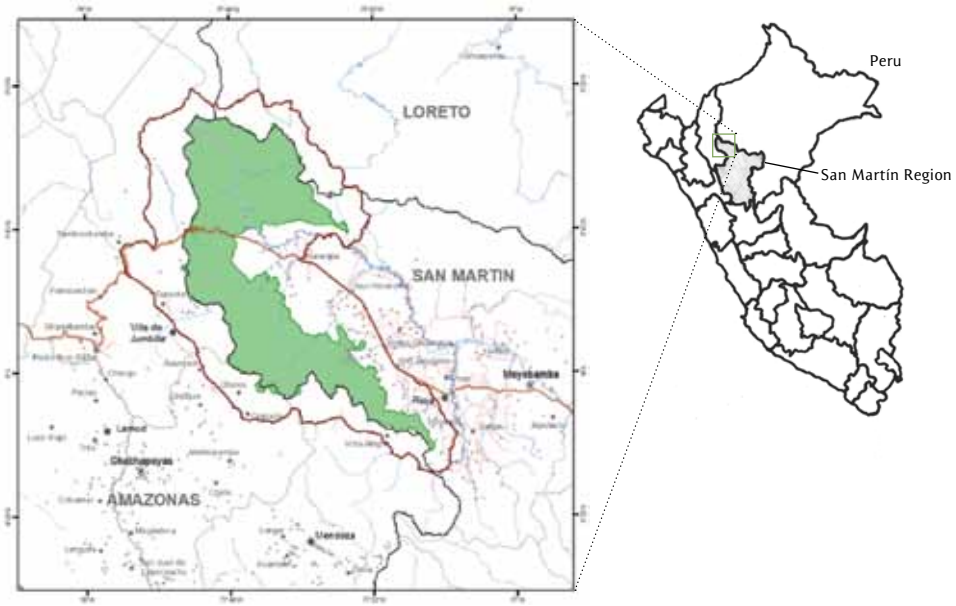
Although not all mechanisms fit neatly into one or another category, this categorization can be used as a framework. This grouping doesn't cover policy and regulatory approaches, which affect the success of these mechanisms and can include enforcement for non-compliance that voluntary mechanisms cannot often provide.

Implementing market and incentive-based mechanisms

REDD+ carbon financing, conservation agreements and eco-certification[2]

The Alto Mayo Protected Forest (AMPF) is located in the San Martín region of the northeast Peruvian Amazon. The AMPF and its buffer zone cover approximately 350,000 hectares of land at varying altitudes, which are home to threatened species and provide important ecosystem services, including water provision to major rivers and carbon storage.

Figure 1. Intervention areas in the Alto Mayo Protected Forest



Source: Conservation International

Since the 1990s a large number of people have moved to the Alto Mayo area. This is due to improvements to the road network and perceived better economic opportunities in the region (compared to the Andean highlands), particularly in the availability of forest land that could be cleared for farming. This has led to increased deforestation. Among the consequences of the deforestation are reduced flows in the Mayo River, which affects hydro-electric plants and leads to power outages and reduced water for irrigation in the lowlands.

The forest has high levels of endemic biodiversity and is therefore of considerable conservation value, with more than 420 bird and 50 mammal species. Deforestation and degradation of ecosystem services — combined with the limited capacity of public institutions to address the problems and their underlying causes — threaten this biodiversity.

An integrated landscape approach

In response to these concerns, Conservation International (CI) and its local partners[3] established the Alto Mayo Conservation Initiative (AMCI) in 2008. The initiative promotes the sustainable management of the AMPF and its ecosystem services for the benefit of the local populations and the global climate (CI 2012). In 2012 CI applied for the administration contract of the protected area and now co-manages the area with the Park Service. The project is meant to continue for at least 20 years to secure improved, long-term, sustainable land and forest practices by linking to environmental markets as a source of financing.

The overriding objective is to promote more sustainable production practices, with a focus on coffee production and the development of secondary-product markets inside the protected area and in its buffer zones. In terms of ecosystem services and reduced deforestation the main objectives are to protect the watersheds in the AMPF and the endangered species living in the protected forest.

The approach has been to sell carbon credits through the United Nations REDD+ programme[4] to generate funds that can support the development of sustainable income sources for families living within the protected forest. In exchange for this support, families sign conservation agreements not to clear more forest or extract timber or other products from the forest.

Market interventions

There were three key elements to this approach, which align with the categories of mechanisms listed above.

Financing

Phase 1 of the initiative was to establish the REDD+ mechanism. CI and its partners generated a REDD+ project document. The project was certified under the Verified Carbon Standard to generate Voluntary Carbon Units (VCUs) from avoided greenhouse gas (GHG) emissions to secure future funding. The initial financing was provided by donated funds.[5]

Ecosystem Service Payments

Families within the AMPF signed Conservation Agreements (CAs), which were financed primarily from the sale of REDD+ carbon credits. The CAs are essentially packages of incentives to decrease deforestation and restore degraded lands through conservation and improved agricultural practices. Families partner with the Park Service to improve overall management, governance and enforcement. The agreements are monitored and renewed annually, depending on compliance with the requirements of no deforestation and participation in forest landscape conservation activities.

Product markets

Once the financing and agreements were in place, the initiative provided support to families living in the park to develop sustainable income sources compatible with forest conservation. Support included technical assistance to promote better management practices in coffee production, inputs such as improved seed and organic fertilizer, alternative product development (e.g., small livestock husbandry and alternative tree crops), and off-farm employment in nurseries or forest patrols.

The principal achievement of the project to date is securing the CAs. This reduces the likelihood that settlers would be expelled from the AMPF, while reducing the areas deforested by them. One of the main attributes of the project is that it demonstrates that conservation and economic development are not mutually exclusive. The project allows farmers to increase their income while achieving net positive environmental impacts. This has been noticed by the national government, and is a pilot model that could be replicated. The project also represents a model of generating income from one market (carbon credits) to help fund improvements in other markets (such as the coffee sector).

Selecting market and incentive-based mechanisms to support ILM

Stacking and bundling

A range of market and incentive-based mechanisms may be used, either sequentially (stacking) or simultaneously (bundling). In the latter case, funds generated from the successful implementation of one mechanism can be used to establish another mechanism, potentially achieving synergies in landscape goals. For example, the Alto Mayo project began by generating funds from the sale of carbon credits to an international company. The project matched a willing buyer with a clear need and potential for conservation through empowering farmers in the region. Generating the REDD+ strategy involved all stakeholders: local government, forest managers, farmers, NGOs and CI. The process included stakeholder consultations to identify deforestation drivers and agents, and strategies to address these challenges.

A second mechanism has also been established. It channels these funds into conservation agreements with local farmers, which specify that they cannot fell trees or exploit wildlife; in return, they receive technical services and inputs for sustainable coffee production and similar activities. The aim is to conserve the forest and its wildlife while meeting the needs of farmers for a more sustainable livelihood from coffee production.

Participatory planning

ILM requires the participation of diverse groups of stakeholders, and the rules for the implementation of market or incentive-based mechanisms need to be negotiated with them. This can be a complex task, particularly where there are existing conflicts over resources, and it requires a high level of coordination, skills in facilitating such processes, and support for less powerful groups in situations of unequal power. In the Alto Mayo, CI was the lead actor; with support from local NGOs it had to negotiate with national authorities about the rules for providing incentives to farmers to stop deforestation. Having an organization such as CI to help generate funds and coordinate with stakeholders to facilitate these interactions was critical.

Even where positive results are achieved, replication in other landscapes is not straightforward. Each landscape, group of stakeholders and issue is different, and each mechanism must be adapted to the circumstances. Although some mechanisms have existed for more than a decade, their complex nature and long-term time frame for achieving outcomes means that they are continually being evaluated and adapted.

Mobilizing policy action

Market-based mechanisms cannot function without an enabling environment of institutions, frameworks and regulations that support ILM goals. This can include accounting for local-level benefits and ecosystem services, focusing on improving rural markets, removal of perverse incentives, and participatory management in policy planning. These conditions are not usually in place in developing countries and non-market funding is needed to develop them. However, this should not discourage land managers from trying to use markets to support ILM. In Alto Mayo, donated funds were used to develop the documentation for the REDD+ project.

Public policy support is critical, but it should enable voluntary market and institutional innovation, not increase transaction costs. In the Alto Mayo case CI was the facilitator, together with a government entity,[6] which was willing to participate in order to lower these costs. A streamlined process of management is possible through better relationships and coordination between stakeholders to ensure common expectations. Leveraging public-sector fiscal incentives and private capital can provide stability for integrated approaches.

Securing pre-financing from the private sector can help to initiate projects and secure the needed public-sector support. This was the case in the Alto Mayo case study. Carbon credits were sold in advance through a long-term agreement with a commercial partner; this, combined with donated funds, allowed the documentation and verification of the REDD+ project. Public investment in infrastructure, pushing for improved practices in state-owned enterprises and other financial incentives can also be mobilized to support ILM.

A supportive legal framework and potential for enforcement is important to the effective implementation of market or incentive-based mechanisms because compliance with the rules becomes more likely. In the Alto Mayo, one of the main incentives was allowing illegal settlers in the region to stay in exchange for compliance with the CAs. There are a number of ways that international, national and regional legal frameworks can help markets support the full range of landscape benefits for production, social well-being and the environment. Regulatory frameworks can provide compensation, or can clarify access and tenure rights.

Conclusions

ILM is a complex process. Long-term collaboration among groups of land managers and stakeholders to achieve multiple objectives requires innovative thinking. Initiatives in the AMFP are evidence of the potential for coordinated action at the landscape scale using sequenced, multi-scale, market-based mechanisms. AMPF stakeholders analyze deforestation every two years to assess levels of carbon storage, quantity and quality of water supply, and local biodiversity. They originally drew on local technical experts to establish baselines, and CI conducted remote sensing. The information from this monitoring and evaluation has been used to enroll more farmers in conservation agreements, by showing the benefits of subscribing.

Promoting diversified livelihood strategies is essential. Especially in the areas surrounding protected areas, generating off-farm employment opportunities is necessary to prevent expansion while maintaining local livelihoods. Sustainability through scaling and replication will be possible only if this strategy is integrated into broader development processes such as regional and national development plans.

Interventions are context-specific, and depend on many variables, such as agro-ecological zones, institutional capacity, governance, regulatory framework and economics (UNCCD-GM and CATIE 2012). Using markets to meet diverse sets of objectives and institutional requirements is critical to ensuring sustainability, where underlying financial incentives support positive outcomes for people, food and nature.

Endnotes

1. This is a loan with lenient terms and with no interest or a below-market rate of interest, or a loan made by multinational development banks (such as the Asian Development Fund), affiliates of the World Bank and government agencies to developing countries that would be unable to borrow at the market rate. See www.investopedia.com/terms/s/softloan.asp.
2. This case was generated by the research of Jeremy Haggar and David Philips of the Natural Resources Institute, Greenwich, UK for a forthcoming report from the Landscapes for People Food and Nature Initiative.
3. Local partners included the Peruvian Society of Environmental Law (SPDA), Association for Research and Integrated Development (AIDER), among others.
4. The UN-REDD Programme is the United Nations Collaborative initiative on Reducing Emissions from Deforestation and Forest Degradation (REDD) in developing countries.

The programme was launched in September 2008 to assist developing countries in preparing and implementing national REDD+ strategies, and builds on the convening role and technical expertise of the Food and Agriculture Organization of the United Nations, the United Nations Development Programme and the United Nations Environment Programme.

5. Initial funds were made available by the Walt Disney Company, in support of meeting its goals of zero net GHG emissions and forest conservation.
6. This was the National Service for Natural Areas Protected by the State/*Servicio Nacional de Áreas Naturales Protegidas por el Estado* (SERNANP).

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5.2 Making existing financing work in Brazil

JINKE VAN DAM and ANDRÉ BRASSER

Introduction

A wide range of financing mechanisms is available to promote forest conservation in Brazil, one of the world's main soy-producing areas. These are failing to overcome the key obstacle to reconciling forest protection and soy production, however: covering the costs for soy producers to set aside lands for forest and nature conservation. Smarter use of existing financing mechanisms is necessary, based on pooling the available resources at a landscape scale.

Context

Brazil has a large number of high-biodiversity areas. Recent policy developments have been made to conserve forests; Brazil managed to reduce deforestation by 70% from 2005 to 2013 (Soares-Filho et al. 2014).

Soy production has continued to grow: between 2000 and 2010, 10 million hectares (ha) of land for soy production were added, an increase of 73%. The expansion of production of an agricultural commodity such as soy often drives the conversion of undisturbed ecosystems. In Brazil, the expansion of soy cultivation was the direct — although not the only — cause of some large-scale forest conversion. The 50% expansion in soy production through 2013 took place entirely on land cleared before 2006. This land became available because beef production (the major use of the land) intensified while the demand for beef did not increase. The lowered demand for pastureland opened up land for soy expansion.

Pooling existing financing mechanisms can support efforts at the landscape scale.

Eventually, cleared land that is suitable for soy production — the most profitable use of this land — will become scarce. The 120,000 km^2 of forests in the Brazilian Amazon that could be profitably converted to soy and that lie outside of protected areas will become the target of deforestation pressure.

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The indirect link between soy expansion and deforestation has generated an international response to introduce sustainable soy production practices and slow its expansion into native forests. This has resulted in the development of various market-based voluntary certification standards for sustainable soy production, the adoption of forest legislation to reduce soy expansion into native forests, and the development of programmes to support producers in enhancing sustainable soy production and making it more profitable.

The Brazilian Forest Code was revised in 2012. The revised code maintains the previous legislation's conservation requirements and protects approximately 193 million ha of native vegetation. Deforestation is allowed on 86 million ha of private property, however. In the Cerrado region, approximately 40 million ha of forest land could be legally deforested. Of the 4.5 million ha slated for restoration in Brazil, only about 0.6 million ha are currently used for crops. Protected areas (PAs) cover around 46% of the Brazilian Amazon. The level of protection in other biomes is remarkably lower; for example, PAs cover only 7% of the Cerrado (Soares-Filho et al. 2014).

Voluntary market initiatives such as certification standards aim to avoid further deforestation by setting conditions for land conversion. Examples are the Round Table on Responsible Soy (RTRS), Proterra, and more generic standards such as the International Sustainability and Carbon Certification system.

The RTRS also requires that part of the land be set aside for biodiversity conservation, based on a High Conservation Value (HCV) assessment. HCVs are biological, ecological, social or cultural values that are considered outstandingly significant or critically important at the national, regional or global level. They are defined through a participatory process (see article 5.5).

The RTRS conducted an HCV mapping exercise in Brazil, identifying categories of land that were critical for biodiversity and that should therefore be set aside. The RTRS requires producers to set aside land above the legal requirement.[1] The HCV map of Brazil developed by the RTRS (version 2013) indicates that 345.5 million ha defined by HCV mapping are classified as Category 1 (forest containing significant natural values) and 2.5 million ha as Category 2 (forest containing significant populations of species in natural patterns) in the Amazon biome. In the Cerrado Biome there are 78.2 million ha of Category 1 land and 19.3 million ha of Category 2 land (pers. comm., RTRS HCV mapping project).

Deforestation is expected to increase in Brazil (Nepstad et al. 2014) and is allowed under the Forest Code. Conservation initiatives and economic incentives are therefore increasingly important for conserving forests and protecting large areas of native vegetation when located outside legally protected areas of the Forest Code (Soares-Filho et al. 2014; Nepstad et al. 2014). The Forest Code introduces the option of financing mechanisms that could reduce deforestation, such as payments for forest carbon and for environmental services.

Requirements in certification and regulations could also be used to promote zero deforestation and to contain any further development of sustainable soy production on degraded lands. This would allow forest areas to be set aside or even restored to create forest mosaics in landscapes.

Success and failure in forest protection in soy producing areas

Producers and buyers in the soy sector have options to reduce negative biodiversity impacts related to soy production. Producers can set aside biodiversity-rich lands, either on their own initiative or to meet certification requirements. Since these requirements go beyond existing legal requirements to set aside land, certification requires additional effort from farmers, including soy producers, that does not compensate them as highly as other land uses do. For certification to be effective on a large scale, acceptance of certified soy by the market is also required, as is preventing the market from being taken over by soy that is cheaper and produced with negative biodiversity impacts.

The effectiveness of setting aside lands, both under the Forest Code and the RTRS, requires above all solving the related financial issues. Producers incur an opportunity cost of foregone forest conversion into arable land. They are currently not compensated for this cost. In addition, the conversion substantially increases the land's value. In Mato Grosso State, clearing forest to create pastures can increase the land value by a factor of five; upgrading this land to soy production doubles the value again. Opportunity cost is thus a key obstacle that prevents many farmers from complying with legal and certification requirements. This obstacle is even greater when certification requirements are more strict than the country's legal requirements, as in Brazil.

There are several relevant options to finance the protection of forests and the environment in soy areas in the short and long term. They include existing certification systems for soy and jurisdictional approaches[2] that include financing mechanisms.

Moving from certifying the soy value chain towards landscape scale

The authors made a global inventory of existing financial mechanisms with the potential to slow down soy expansion into native forests (Brasser, van Dam and Verweij 2013). They identified 15 financial mechanisms that could create the incentives needed for soy producers to conserve forests and the environment. Each mechanism was screened against five criteria:

- practicality, based on experiences in (soy) agricultural production;
- simplicity of implementation;
- contribution to enhanced market demand for sustainable production;
- feasibility of cooperation with other sectors; and
- presence of a regulatory basis at the federal, state or regional level.

Most mechanisms were applicable in the mid and long term, rather than the short term; they require cooperation with other sectors and the development of a regulatory framework. A two-part strategy could make available financing effective in conserving forests in Brazil's soy producing areas: a short-term approach to accelerate HCV-based certification, complemented by a sustainable landscape approach, which is expected to be effective in the mid to long term.

Short term: accelerating certification

The short-term strategy aims to conserve biodiversity by means of responsible farm management based on the HCV approach. Production is certified, with the key condition that producers are compensated for the additional costs for certification, opportunity costs and product losses. Since certification is a market mechanism, financing mechanisms to cover these costs should be voluntary and should apply to the private sector. Certification premiums have so far contributed little to the decline in deforestation (Nepstad et al. 2014). Market incentives that accelerate certification could be provided by other market participants; for example, commodity suppliers could give better terms on supplies and inputs and banks could give lower interest rates or better terms on loans to farmers who are legally compliant.

Sustainable purchasing policies by retailers and their suppliers can also help accelerate certification. The Consumer Goods Platform, a worldwide network of retailers and manufacturers, is piloting a mechanism to channel some certification premiums to a sustainable soy fund in order to finance biodiversity conservation in soy production areas. The fund can be used for specific investments, including compensation for biodiversity set-asides.

Domestic government funding is the most promising mechanism to accelerate certification. The Brazilian government provided US$ 1.7 billion in 2012 for the Low-Carbon Agriculture (ABC) programme that addresses the country's second-highest source of carbon dioxide emissions: agriculture. This programme was launched in 2010 to help Brazil meet a pledge made at the 2009 Copenhagen climate conference. The fund is managed by the National Development Bank and provides interest rates that are 2% lower than those provided in credit markets. Applicants need to be in compliance with the Forest Code and Labour Code and land tenure must be clear.

The Critical Counties programme in Brazil, for farms located in the 36 counties with the highest deforestation rates, is accessible only to farmers who invest in land-use practices that reduce deforestation. Other existing finance programmes, such as the Amazon Fund, finance farmers who invest in certified land-use practices with low deforestation rates.

Limited demand for certified soy and strong competition between different certification systems are obstacles to the development of markets for HCV-inclusive certified products. This reinforces the need to develop an approach beyond certification for the middle to long term.

Middle to long term: a sustainable landscape approach

Interventions to stimulate soy certification already integrate mechanisms outside the soy sector, such as climate financing (low carbon agriculture) and forestry (anti-deforestation requirements for credits). For the middle to long term there is great potential to scale up this integration. Given the involvement of local and national governments and other sectors in more effective financing mechanisms, a shift from interventions targeted to the farm level to landscape-scale efforts is needed. A landscape approach has already been adopted in the Critical Counties programme, where interventions are at the county level instead of the individual farm. The programme stimulates collective action by making existing financial mechanisms from various sectors more accessible, including forestry, protected areas and regional development budgets. Brazil has a number of promising mechanisms for a sustainable landscape approach.

Environmental Reserve Quota

The Brazilian Forest Code has a series of compensation and incentive schemes for reforestation and forest protection based on watershed conservation. The Environmental Reserve Quota (*Cota de Reserva Ambiental*, or CRA) is an economic instrument provided for in environmental legislation. Its main goal is to create an economic asset for rural landowners. The CRA is a tradeable legal title for areas with intact or regenerating native vegetation that exceed the Forest Code's requirements. The CRA "surplus" on one property may be used to offset a deficiency on another property within the same biome and, preferably, the same state (Soares-Filho et al. 2014).

REDD+

In Brazil, REDD+ revenues accrue to the federal government. They are spent on governance, extension services in support of agricultural intensification, improvement of infrastructure, and access to markets for farmers in exchange for avoiding deforestation. National governments are encouraging compliance with REDD+ through extension programmes, land zoning and other tools that use existing domestic funding plus the revenues from REDD+ and from certification. REDD+ requirements could be compiled from criteria developed in international certification standards, including RTRS.

Ecological tax

The tax on the movement of goods and services (*Imposto Sobre Circulação de Mercadorias e Serviços*, or ICMS) is a federal tax levied by states and the main source of revenue for the states. Federal states have the autonomy to allocate 25% of the ICMS revenues to their municipalities and to tools for ecosystem service provision. States such as Paraná and Mato Grosso have defined environmental criteria to allocate their funding (pers. comm.,

Roundtable on Responsible Soy). In Paraná, 5% of the revenues received from the ICMS are distributed to municipalities with conservation units or protected areas and to those that supply water to neighbouring municipalities. States allocate more revenue to those municipalities with the greatest areas under environmental protection. At the municipality level compliance with certification requirements for sustainable soy production could be linked to the allocation of this funding.

Green Municipalities Programme

The Green Municipalities Programme in the State of Pará aims to significantly reduce deforestation while promoting a shift to a low-carbon rural economy. The programme is based on the successful experience of Paragominas. In two years, this municipality went from having the highest deforestation rate of Amazonian municipalities to being a national example of how to successfully balance conservation and production. The programme is designed to provide local economies with sustainable foundations, integrating support from producers, civil society and government.

Integrated approach at the landscape level to mobilize existing funding

The discussion on improving forest protection in soy-growing areas focuses too much on mobilizing resources from within the soy sector. Forest and environmental conservation in soy-producing areas goes beyond the forest sector. It calls for an integrated approach at the landscape and sector level and the cooperation of multi-stakeholder groups, including the implementation of adequate financing mechanisms.

The integrated approaches that are being developed in various federal states have the potential to better address financing for ecosystem service provision, including how to cover the costs to soy producers who set aside lands for forest and nature conservation. An increasing number of tools and mechanisms are available to approach this issue at the landscape scale, and to align it with strategies with similar objectives from other sectors. Expertise in coordinating mechanisms with similar objectives is being developed in several states. Successful strategies to improve forest conservation in soy-producing areas should build on this expertise, which requires a cross-sector approach.

Recommendations and conclusions

In the short term, certification — in combination with the HCV approach — is an appropriate tool to conserve biodiversity through setting aside lands. Financing is the main bottleneck that needs to be addressed to effectively implement this approach.

In a landscape approach, the financing needed to create viable biodiversity set-asides can be generated from inside and outside the soy sector or from other financing sources.

Developing synergies between these financing sources can create new financing opportunities and lead to improved implementation of shared national and regional agricultural and biodiversity policies.

This requires the active cooperation of the major stakeholders in soy-producing areas, including governments, financial institutions, NGOs, private companies and farmers and with other relevant agricultural sectors that influence land use in high-priority areas.

Acknowledgement

This article is based on a study commissioned by Utrecht University, the Netherlands (Brasser, van Dam and Verweij 2013).

Endnotes

1. The amount of land to be set aside under a certification scheme depends on the extent of identified HCV areas on the property.
2. A jurisdictional approach applies to the territory of a legal entity such as a municipality. Certification schemes operate at the farm level.

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5.3 Certified timber production and landscape governance

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Natural tropical forests cover more than 1.6 billion hectares (ha) in 65 countries; more than half (887 million ha) of them are primary forests (ITTO 2012). Although deforestation rates have been reduced in some of these countries, e.g., Brazil and Mexico, they remain high. In addition, vast forest areas are degraded. Deforestation is mainly due to conversion for agricultural land; forest degradation is caused mostly by unsustainable logging practices, both legal and illegal.

The area subject to unsustainable forest exploitation is estimated to range between 0.85 and 1.1 billion ha; about 131 million ha are officially designated for commercial logging. It is estimated that only 31 million ha are managed under sustainable production schemes, and that even less (17 million ha) is managed by certified forest companies (ITTO 2012).

Since the pressures on natural forests in developing countries are likely to persist in the near future, many forest ecosystems are threatened by conversion or degradation, which impair the many services and benefits they provide. Recently, political efforts to cope with these threats have shifted in focus from the project level to the more comprehensive landscape level. It is considered to be an appropriate scale for managing and governing different but intricately linked land uses, including various forms of forest use, agriculture and settlements (Figure 1), and the dynamics within the landscape. Landscapes can be considered socio-ecological systems with demarcated boundaries and characteristics that are the result of the action and inter-action of bio-physical and socio-economic factors. The aim of landscape governance is to effectively address interlinked land use through comprehensive cross-sector policies within a jurisdiction.

Certified companies that manage natural forests are an important element in more effective and environmentally sound governance of productive landscapes.

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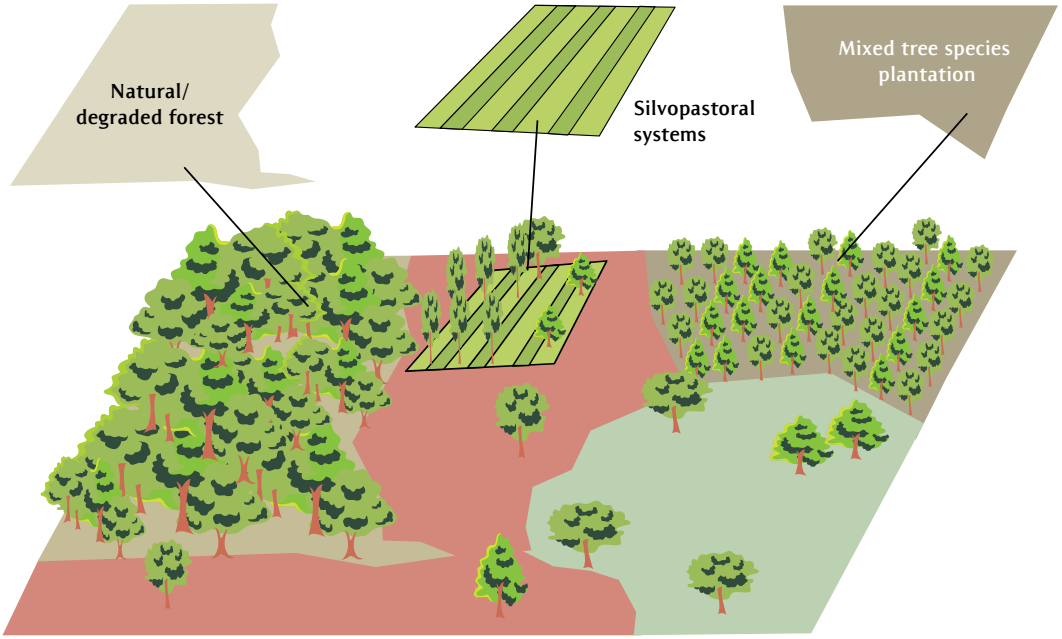
Natural forests are still a core element of many landscapes. They are subject to different pressures and are more threatened by conversion and degradation than other land uses. This article identifies how natural forests dedicated to production in tropical landscapes can be better integrated in environmental governance. It is based on an empirical study commissioned by GIZ and carried out by UNIQUE[1] that identified and assessed the best management practices currently applied in natural forest areas designated for production. The study focused on large-scale management.[2]

Figure 1. Land-use elements of multifunctional production landscapes



The study

The study identified the best natural forest management practices in tropical regions. It was based on two main assumptions:

- a natural forest that is responsibly managed is closer to the natural dynamics of primary ecosystems than any other form of large-scale commodity production scheme. Natural forests can balance economic, ecological and social objectives in maintaining natural capital and ecosystem services; and
- certification and third-party verification are key to ensuring that forests dedicated to production within a landscape are managed sustainably and do not endanger the ecosystem functions — e.g., the hydrological services it provides for agriculture, drinking water and water retention — that are vital to the entire landscape.

Methodology

The study focused on companies that manage large areas of natural tropical forests (> 3,000 ha) and whose operations are certified by one of the globally recognized certification schemes: those of the Forest Stewardship Council and the Programme for the Endorsement of Forest Certification. Although small-scale forest management is important, these large companies should act as role models for production landscapes with large remaining portions of natural forests.

The study involved a thorough literature analysis. In addition, 187 companies in tropical Asia, Africa and Latin America were asked to respond to a detailed questionnaire on silvicultural production system and management practices; costs and revenues; social and environmental impacts; forest legislation and governance; and the effects of international policy developments to curb unsustainable forest use and illegal logging (e.g., REDD+, FLEGT and the U.S. *Lacey Act*). Of the 187 companies, 51 — local businesses, cooperatives, state-owned enterprises and multinationals — responded with detailed information about their activities, the relationship to their environment and the landscape context. The study team also visited six companies, and interviewed other stakeholders, in particular local communities and NGOs.

Best practices in practice

Although most enterprises (87% of respondents) operate in areas where land-use change is not permitted, many of them noted an increasing trend in their area to convert forest to other land uses.

Technical and economic elements

Integrated management planning is a requirement of certification schemes and is subject to audits. More than 80% of the companies who responded to the questionnaire apply the recommended management planning practices identified in the literature analysis. In terms of silvicultural practices, nearly all companies try to secure forest regeneration, either by managing natural regeneration (77%) or by enrichment planting (5%). However, less than 20% apply comprehensive silvicultural treatments to enhance forest productivity. Since harvesting is limited to only a few tree species, there may be a gradual shift towards a less commercially viable forest. In consequence, the sustainability of yield in terms of value generation might be jeopardized.

Reduced impact logging (RIL) is a prerequisite for certification and its principles are generally accepted by the companies studied. Most companies have RIL guidelines and procedures, but there were indications that on-the-job training, road construction and low-impact skidding leave room for improvement.

Harvested volumes seldom exceed one cubic metre/ha/year, which is significantly below the average annual increment of the respective forests. As noted, harvesting targets only some commercial species. Realizing the commercial potential of other tree species is considered a major challenge by most companies, which try to improve profitability in the value chain rather than through stimulating growth and sustainable yield.

Socio-economic and governance elements

Approximately 60% of the forestry companies are surrounded by communities where subsistence farming is the main activity. More than 40% reported conflicts with communities, mainly concerning illegal logging activities and encroachment on forests. More than 80% of the companies employ staff who are responsible for good relationships with communities, e.g., by involving them in management planning, conducting regular meetings with them, generating jobs or implementing out-grower schemes. Fair employment practices are widely applied, and the turnover in employees is low, despite hard working conditions. Employment conditions are a main aspect of certification schemes and are usually audited in detail.

Most of the companies who responded operate in countries that have a substantial informal sector (mainly related to illegal logging, but also to timber processing and commercialization) and often suffer from weak institutions that are susceptible to corruption. This problem is worsened by the remoteness of the management units. The majority of companies who responded to the questionnaire stated that informality (58%) and illegal logging (66%) were the main barriers to improving economic performance and to fair competition.. A similar percentage called for the formalization of the forestry sector, particularly through clearly defined regulations on land use and forest management and strong enforcement.

Environmental elements

Forest management practices have two main environmental aspects — designation and maintenance of protected areas, and minimizing the environmental impacts of management, especially harvesting operations. Most companies maintain protected areas within their forest management area and more than 80% have good relationships with or are actively supported by environmental groups. Less than 10% consider protected areas to be a barrier to their operations and approximately 20% perceive the respective monitoring obligations as too costly and complex. As required by the certification schemes, nearly all companies covered by the study apply RIL techniques and monitor environmental impacts.

Discussion

The study results reveal a high congruence between the elements defined as best practices and the practices applied on the ground. Some aspects of best practices are not applied by all companies, however, such as enhancement of productivity. Certification and third-party verification cannot guarantee sustainable management, but at least for the large enterprises studied, compliance with certification schemes contributes to balancing economic interests, environmental requirements and social aspects.

The sustainable management of forests is a prerequisite for effectively governing production landscapes and reconciling environmental and development objectives, and achieves three goals:

- it protects forest cover and helps safeguard essential ecosystem services;
- it provides employment and livelihood alternatives; and

- it serves as an example of how other land uses may be managed in a more sustainable fashion, including approaches for certification.

The study underlines that the companies that apply best practices perceive notable competitive disadvantages (due to significantly higher production costs) compared to those legal and illegal timber producers who harvest timber without the requirements of certification schemes. The study identified four key challenges that have the potential to be turned into opportunities for promoting sustainable management approaches in a broader production landscape context: reducing opportunity costs; enhancing productivity; improving marketing; and effective governance. These opportunities, which are interconnected, generally aim at both increasing the attractiveness of sustainable land use by stimulating its competitiveness and ensuring that the appropriate enabling conditions (legislation and governance) are in place.

One of the companies studied (FORCERPA in Paraguay) showed that well-managed natural forests can generate annual profits ranging between US$ 60 and 80 per ha/per year. That is competitive with cattle ranching, but not with intensive land uses such as agriculture or plantation forestry. This is an important finding with regard to landscape governance, as many remote forested landscapes face increasing threats from conversion of natural forests into intensive land use.

Policies and measures that strengthen competitiveness are therefore an important step in reducing the pressure of conversion. This can be achieved on the supply side by reducing opportunity costs compared to other (presumably less sustainable) land uses, e.g., by enhancing productivity and optimizing silviculture practices. This allows for harvesting rates that can be more than 50% higher, depending on local circumstances, and consequently for a better economic performance (Grulke and Ortiz 2009).

The costs of silvicultural treatments are around US$ 50 per ha (with one treatment every 10 to 20 years), which is equal to US$ 3–5 per ha/per year. The treatment leads to a significantly higher yield.

The marketing of timber products can be improved through strategies for creating a favourable market environment and strengthening the demand for sustainably produced and certified timber. Companies should seek to identify marketable uses for tree species not previously identified as merchantable and/or find ways to integrate the value chain.

The market environment in which such enterprises operate is linked to effective forest legislation and governance. Crucial problems include unclear traditional user rights, land tenure issues and timber market distortions from illegally logged timber. International policies such as FLEGT, the U.S. *Lacey Act* and internationally accepted performance standards for investments help to create fair conditions for legally and sustainably producing forest companies. Uncertainties, informality and illegality are barriers to successfully promoting and implementing the responsible management of natural forests.

Dealing with these factors also helps to address the causes (e.g., through more and better employment) of some of the problems, such as illegal logging. Certified companies that manage natural forests are thus an important element in more effective and environmentally sound governance of production landscapes. They contribute significantly to sustainable landscape governance and to rural development objectives. For example, an integrated management approach creates more and better-paid jobs and requires more highly trained staff. It also ensures a more reliable supply for the local and regional timber processing industry. This is another important factor for rural development, since it improves the local value chain. Integrated management cannot, however, solve all land-use problems, such as corruption, weak institutions and the need for formalization. These need to be tackled through appropriate governance interventions, which should integrate or improve on other types of forest initiatives such as community forest management.

The study shows that best practices will not be sufficient by themselves. There is a particular need to cope with locally specific legislation and governance problems. The promotion of certified timber production from natural forests should receive greater weight in national and sub-national budgeting processes, international public investments and private-sector investments. Regulation and voluntary commitments by intermediary actors, such as banks, that commit to zero-deforestation and give loans only to certified companies committed to sustainable management of their forests are interesting options, as are any efforts that effectively cope with illegal logging. Such policy measures and commitments would also increase the attractiveness of such companies for investors — public or private enabling investors as well as asset investors — e.g., through national or multinational development banks (Elson 2012).

Conclusion

This study considered only those companies participating in forest certification schemes; these certification standards should broaden their focus to the broader landscape context. The study shows that the standards help to secure a balance between economic, environmental and social aspects. However, as depicted in Figure 1, natural forests are only one element in production landscapes. They compete directly with other land uses, and unless the externalities between sustainable and unsustainable management approaches are addressed (e.g., through regulations and certification) this form of natural resource management will remain the exception.

A broader consideration of sustainable management of all relevant land uses, as promoted in international policy discourses, could be a way to enhance the comprehensive and effective governance of these landscapes. A multiple land-use standard should build on the lessons learnt from forest certification, and also consider additional aspects: rural area and other development objectives, road and water infrastructure requirements, commodity chains and the protection or enhancement of the flow of ecosystem services. Such a landscape-level certification approach would make an important contribution to landscape governance.

Endnotes

1. UNIQUE forestry and land use GmbH is a consultancy and project developer in forestry and land use, with offices in Germany, Uganda and Paraguay and representatives in Argentina, China and India.
2. A similar empirical study on community forest management is in preparation.

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5.4 Environmental governance in the Colombian Amazon

CARLOS A. RODRÍGUEZ, MARIA CLARA VAN DER HAMMEN, ULDARICO MATAPÍ, RODRIGO YUCUNA and CATALINA VARGAS TOVAR

The Colombian Amazon is one of the better-conserved continuous forest areas in the Amazon basin. The area is home to a great diversity of ethnic groups, and public policies recognize their cultural and territorial rights over more than twenty million hectares (ha). The region also has more than six million ha of national parks. These circumstances support the permanence of this ecosystem and constitute a great contribution by Colombia to the conservation of tropical humid forests worldwide.

According to a study on the symbolic understanding of the territory carried out by two traditional authorities of the indigenous Yucuna and Matapí groups (Matapí and Yucuna 2012), it is important to consider shamanic concepts and practices in the management of tropical forests by indigenous communities. It is also necessary to involve these people in the institutional arrangements for environmental governance. From a traditional perspective, the management of the territory should be the responsibility of the ethnic groups who live there. They have a detailed knowledge of the territory, the landscape and existing resources, and they operate under the ecological and cultural principles of balanced management that prevents over-exploitation (Matapí and Yucuna 2012).[1]

Including traditional knowledge in decision-making processes will strengthen local governance.

The traditional territory: the vision of shamans

The Yucuna and Matapí occupy the Miritíi River watershed in southeast Colombia. Relatively isolated, they are traditional ethnic groups who have maintained a great command of traditional knowledge associated with their territory. They feel that in-depth knowledge of everything that exists in the territory is necessary for the effective management of social relationships within communities and for the appropriate use of natural resources.

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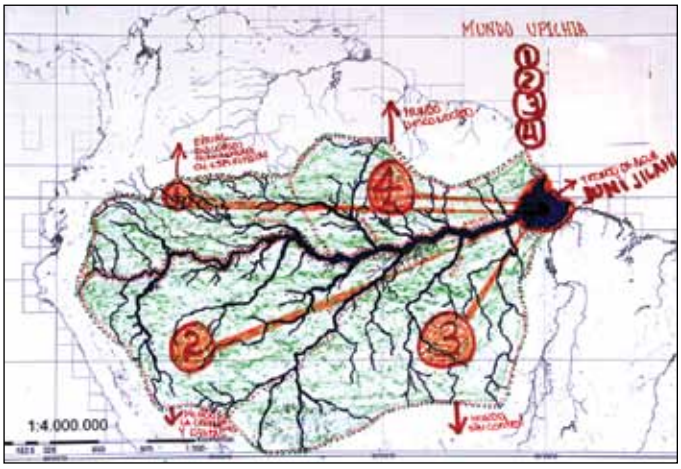
Elders with a large and specialized knowledge of nature and its resources, also known as shamans, know the names of all the topographical features in their traditional territory, starting from the mouth of the Amazon River and ascending to the head of the Miritί River, which is where they were born and where they live.[2] They consider the greater Amazon Basin as a "great house" (or *maloca*) in which multiple ethnicities are distributed. According to shamans, this enormous region is subdivided into four main areas with sociocultural and ecological similarities. Each of these four cultural areas has its own languages, lineages, rituals and material culture (Figure 1). This article focuses on the first area, defined as the "area for shamanic discourses and spiritual owners" (Matapí and Yucuna 2012). It corresponds to the northwest Amazon, one of the best-preserved areas in the basin. The other three areas are home to other ethnic groups, who have specific ways to manage the forest that are different than those of the Yucuna and Matapí.

Figure 1. Four cultural areas of the Amazon Basin according to shamanic knowledge

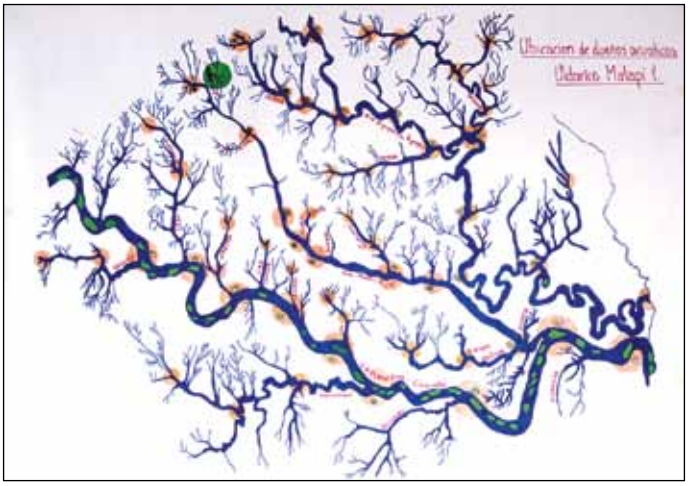


Source: Matapí and Yucuna (2012)

The place of birth and the multi-ethnic territory

The shamans consider the forest to be governed by spiritual owners. Spiritual owners are symbols of a great power that must be asked for permission to use the natural resources located in its domain. They may be understood as forces or entities from the supernatural world that supervise the appropriate use of the resources in a territory. For example, spiritual owners of the aquatic world create and take care of aquatic species, especially fish. When shamans ask permission of the water owners, they name, in a kind of recitation, all the related topographic features, including tributaries, creeks, lakes and lagoons — and the beings that inhabit them — along the Caquetá, Miritί and Apaporis rivers. They even include important aquatic sites located in flooded forests and areas where *cananguchо* palm *(Mauritia flexuosa)* predominates, as well as rapids and backwaters (shown as orange circles in Figure 2).

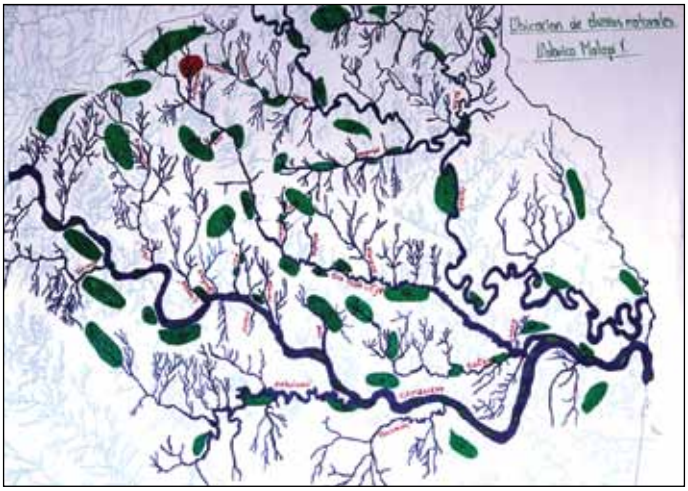
Figure 2. Location of the spiritual owners of the aquatic world



Source: Matapí and Yucuna (2012)

The terrestrial world also has spiritual owners and their presence is recited in a mental journey that ascends from the mouth to the head of each river (Figure 3).

Figure 3. Location of spiritual owners of the terrestrial world



Source: Matapí and Yucuna (2012).

Shamans have detailed knowledge of all the features of the Miritί, Caquetá and Apaporis rivers in the area. They feel that the management of the territory also requires a deep knowledge of its geography. A fundamental concept for indigenous people is that the territory is shared; it is structured by an intricate set of inter-ethnic relationships and by social rules and rituals among the Caquetá, Miritί and Apaporis communities. The territory may be considered a management unit in which more than 30 ethnic groups

have their birthplace (Figure 4). The territory was defined in ancestral times by the creators, a special category of spiritual owners, who transmitted the management rules that the shaman of each ethnic group had to follow.

Figure 4. Territory of the Yucuna-Matapí and other ethnic groups

Source: Matapí and Yucuna (2012)

From traditional territory to *resguardos* and protected areas

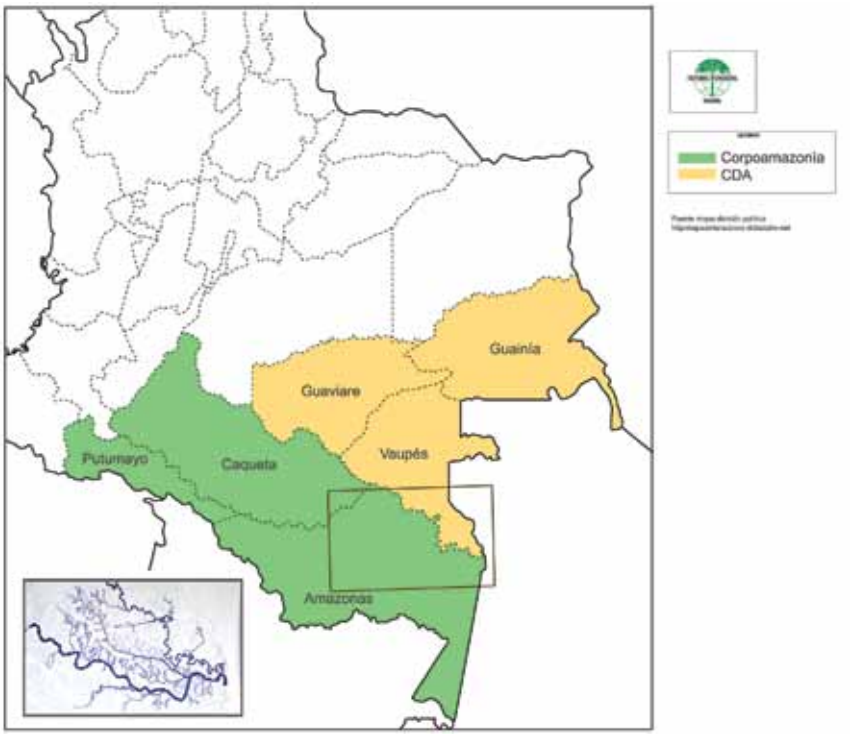
Colombian land rights policies for the indigenous people of the Amazon are some of the most progressive in the world. More than 22 million ha are formally recognized as indigenous communal lands called *resguardos*.[3] *Resguardos* establish legal title over large areas of land and provide political and administrative autonomy to indigenous authorities. This is in line with the political-administrative decentralization strategy that began with the 1991 Constitution.

The boundaries of *resguardos* were determined partially on the basis of ethnic identity and occupation patterns. However, this did not sufficiently consider the shamanic understanding of inter-ethnic relationships. The establishment of *resguardos* has caused a division of traditional areas and of cultural contexts. It has also led to new structures of political representation by indigenous communities that are not in line with local cultural principles or traditional management practices.

The institutional arrangements between indigenous people and public institutions have also failed to consider the ancestral concepts of territory. For example, there is a great deal of administrative overlap. The Amazon region has three southern provinces: Putumayo, Amazonas and Caquetá; and three northern provinces: Guaviare, Vaupés and Guainía. This political division was the basis for setting up public corporations for sustainable development, which are the agencies who exercise environmental authority. Corpoamazonia is the governmental agency for the sustainable development of the southern Amazon (Putumayo, Amazonas and Caquetá provinces); the Corporation for

Sustainable Development of the Eastern and Northern Amazon (*Corporación para el Desarollo Sostenible del Norte y el Oriente Amazónico*, or CDA) is the agency for the northeast Amazon, including Guaviare, Vaupés and Guainía provinces; Figure 5).

Figure 5. Overlap of political, administrative and traditional divisions



Along with these institutional entities, the National Authority for Aquaculture and Fishing (AUNAP) operates at the national level and is responsible for the management of fishing resources in the Amazon's water bodies. This institutional structure separates the management of aquatic (AUNAP) and terrestrial (the *Corporaciones*) landscapes.

The overlap of national parks and indigenous *resguardos*

Protected areas and indigenous *resguardos* are an important part of the administration of landscapes and natural resources in Colombia. More than 30 million ha of the Colombian Amazon have been designated as protected areas and they have become vital to the conservation of rainforests in the country.

Colombian legislation allows for an overlap between indigenous territories and protected areas, which are part of the national park system. Within this legal framework, many national parks have been established in indigenous territories in the last 30 years. This is a consequence of the compatibility between indigenous territories and protected areas in terms of conservation.

The past decades have seen both collaboration and conflict between indigenous authorities and the national parks agency. Although many co-management schemes and management regimes have been developed, some people feel that new protection categories are needed that recognize the conservation role and autonomy of indigenous communities. Some indigenous *resguardos* completely overlap national parks; this may require a new governance framework that simultaneously guarantees the autonomy of communities and the conservation objectives of the park. New institutional platforms for co-management processes are being planned by Colombian authorities. Figure 6 shows overlapping protected areas and indigenous territories in the Colombian Amazon.

Figure 6. Overlap of national parks and indigenous resguardos

An overlap of physical territory may suggest that there is an overlap of management criteria. However, many conflicts arise because neither the national park authorities nor the indigenous *resguardos* have a thorough understanding of the traditional territory or the shamanic concept of it. From a practical perspective this has generated cultural fragmentation within the territory and its landscapes and in the governance of natural

resources. It is necessary to structure relationships in a way that combines shamanistic concepts and western governance parameters within protected areas. This would include developing programmes for cultural strengthening.

In spite of the conflicts caused by overlapping jurisdictions, progress has taken place; agreements between government institutions and indigenous authorities have been formulated. Almost five years ago, for instance, Yaigojé Apaporis National Park was declared in the Yaigogé indigenous *resguardo* as a result of a fruitful process of inter-institutional dialogue and coordination. The resulting agreement jointly protects the subsurface resources from mining exploitation (*resguardos* do not include ownership of underground resources; protected areas protect them). The creation of a large national park — about one million ha — over the entire area of a resguardo was a request by the indigenous community. This was unprecedented, and showed the scope of action that political-administrative negotiation and inter-administrative coordination allows. In the long run, this cooperation will support the protection of natural resources. The agreement also demonstrates the need for tools for environmental management and for strengthening the dialogue and interaction between public institutions and indigenous authorities.

Holistic landscapes and intercultural governance

The shamans' traditional concept and knowledge of the territory is sophisticated and detailed, and considers the rainforest from a holistic perspective. This complex and integral understanding of the territory needs to be incorporated in political-administrative decision-making. It is vital to recognize the importance of the shamanic world, the origin of the territory, cultural networks and the interactions among ethnic groups in order to incorporate indigenous knowledge in the conservation of the Amazon's tropical forest. According to the Environmental Information System of Colombia, the best-conserved areas correspond to the presence of indigenous communities since 43% of the forests are concentrated in *resguardos*. The use of traditional management strategies can help ensure that small agricultural plots restore into mature forest.

The great *maloca* of the indigenous peoples is undergoing wrenching changes, and in many cases is disappearing due to sociocultural, political and economic upheavals that affect every ethnic group and region. It is necessary to recover the cultural foundation of shamanistic knowledge and build processes that support dialogue with shamans. Including traditional knowledge in new decision-making processes will strengthen local governance. All of these processes will be much stronger if they take into account the ecological and cultural principles of traditional management used by shamans.

As mentioned, the traditional territory of the Yucuna-Matapí contains six political divisions, four national parks,[4] and ten indigenous *resguardos*.[5] Local people must promote an awareness and understanding of this traditional territory among government institutions and strengthen indigenous organizations so they can consolidate multi-ethnic associations and Traditional Indigenous Authorities (*Asociaciones de Autoridades Tradicionales Indígenas*, as set out in the Constitution) that respect ethnic interactions, shamanism and rituals. At the same time it is necessary to strengthen a dialogue platform

and coordination mechanisms so that fragmented territories become governable holistic landscapes that integrate economic, social, cultural and environmental components in the well-being of communities and forests.

Endnotes

1. Several cultural and ecological principles are followed: the territory is a multi-ethnic space where each group has its own mythical birthplace and its own ritual duties for harmony's sake; each group knows the toponomy of its traditional territory; everything in nature has a spiritual owner and nothing may be used without permission; the *maloca* is the basic unit for interacting with nature; the shaman is in charge of keeping a harmonic relationship with all the spiritual owners; each ethnic group has been assigned a specific set of plants, cultivars, animals and fish for their use and care; and each group recognizes specific sacred plants, animals and sites.
2. Through traditional education, shamans learn stories, chants and recitations with complex information about the forest. These teachings are passed from generation to generation.
3. In the late 1980s, the Colombian government recognized *macro-resguardos* in Amazonia; one of them, Predio Putumayo, has more than five million ha.
4. They are Chiribiquete, Yaigojé-Apaporis, Cahuinarí and Puré.
5. They are Predio Putumayo, Miritíi-Paraná, Nonuya-Villazul, Aduche, Monochoa, Amenane, Puerto Córdoba, Comeyafu, Camaritagua and Curare Los Ingleses.

Reference

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5.5 High Conservation Values in the landscape, West Kalimantan

EDI PURWANTO, KASUMA WIJAYA,
KRESNO DWI SANTOSA and EKO MANJELA

Introduction

The concept of High Conservation Value (HCV) was proposed in 1999 as one of the principles of the sustainable forest management standards developed by the Forest Stewardship Council (FSC).[1] According to the HCV Resource Network, "High Conservation Values (HCVs) are biological, ecological, social or cultural values which are considered outstandingly significant or critically important, at the national, regional or global level."[2] The HCV concept was designed to help forest managers improve the social and environmental sustainability of wood production. Under its two-step process, areas with exceptional social, cultural or environmental values in or near a forest management unit (FMU) are identified and designated. A system of management and monitoring is then implemented to guarantee that these values will be maintained and enhanced.

Although the HCV concept was originally designed for the management of natural production forests,[3] the concept rapidly gained popularity in other contexts, such as industrial timber and oil palm plantations (Consortium of the revision of the HCV toolkit, 2008). HCV assessment is a requirement in processes such as the Roundtable for Sustainable Palm Oil (RSPO) and Indonesian Sustainable Palm Oil (ISPO) certifications for oil palm plantation, and the FSC process for certification of natural |and plantation forest management.

As a planning tool, HCVs help societies achieve a rational balance between environmental conservation and economic development.

In Indonesia, 450 certified management units — covering natural forest production, pulp plantation and oil palm plantations — have defined and are managing their HCV areas. More than 500,000 hectares (ha) of production area in Indonesia have been identified and designated as HCV area. HCV areas are managed by the private sector, while conservation areas (which are established by the government) are managed by the Ministry of Forestry.

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The fundamental basis of the HCV concept is that areas with high conservation values are not necessarily designated as protection zones where development is forbidden. Rather, the HCV approach is a planning tool that helps society achieve a rational balance between environmental conservation and economic development. HCV is also suitable for use by governments to undertake landscape conservation planning (LCP). LCP ensures the maintenance of fundamentally interdependent biological, social and ecological values that require integrated management.

This article describes the use of HCV as the basis of landscape-level conservation planning at the scale of a watershed unit.

The study area

In order to test the potential of the HCV concept as a basis for LCP, TBI conducted a study in the Pawan watershed, Ketapang District, West Kalimantan Province. The Pawan watershed covers about 14,171 km^2, about 40% of Ketapang District. The watershed was originally dominated by lowland natural dipterocarp forest, but during the past 20 years it has experienced a high rate of forest conversion, mainly to oil-palm plantation. The watershed was selected as a study site for two reasons:

- many concession-holders in the area have identified and are managing HCV areas; and
- the area is representative of the process of land-cover change in Kalimantan.

The watershed ranges in altitude from 0–1,250 metres asl. It is dominated by flat and gently sloping areas, with hilly terrain in the lowland and (sub) montane zones. Gunung Palung National Park is located in the hills in the lowland zone and is home to 7,000 Bornean orangutan *(Pongo pygmaeus)*, about 5–10% of the world's remaining wild orangutans.

The lowland zone consists of mangrove forest, coastal forest, riparian forest, lowland forest, mixed dipterocarp forest, heath, peat swamp forests, freshwater swamps and wetlands. Mixed dipterocarp forests constitute the largest ecosystem, followed by the lowland zone, swamp forest ecosystem and montane forest. Land cover has changed rapidly from secondary forest to oil-palm plantations. Illegal, small-scale gold mining has spread through the upper and middle parts of the catchment, causing severe river pollution. The main threats to the national park are illegal logging and encroachment, which has led to forest fires and destruction of orangutan habitat.

Methodology

HCV areas are defined as areas that possess one or more HCVs. The revised HCV Toolkit for Indonesia (Table 1) defines six HCVs with sub-values. These sub-values can be

classified in one of three categories: biodiversity values (HCV 1, 2 and 3); ecosystem services values (HCV 4); and social and cultural values (HCV 5 and 6).

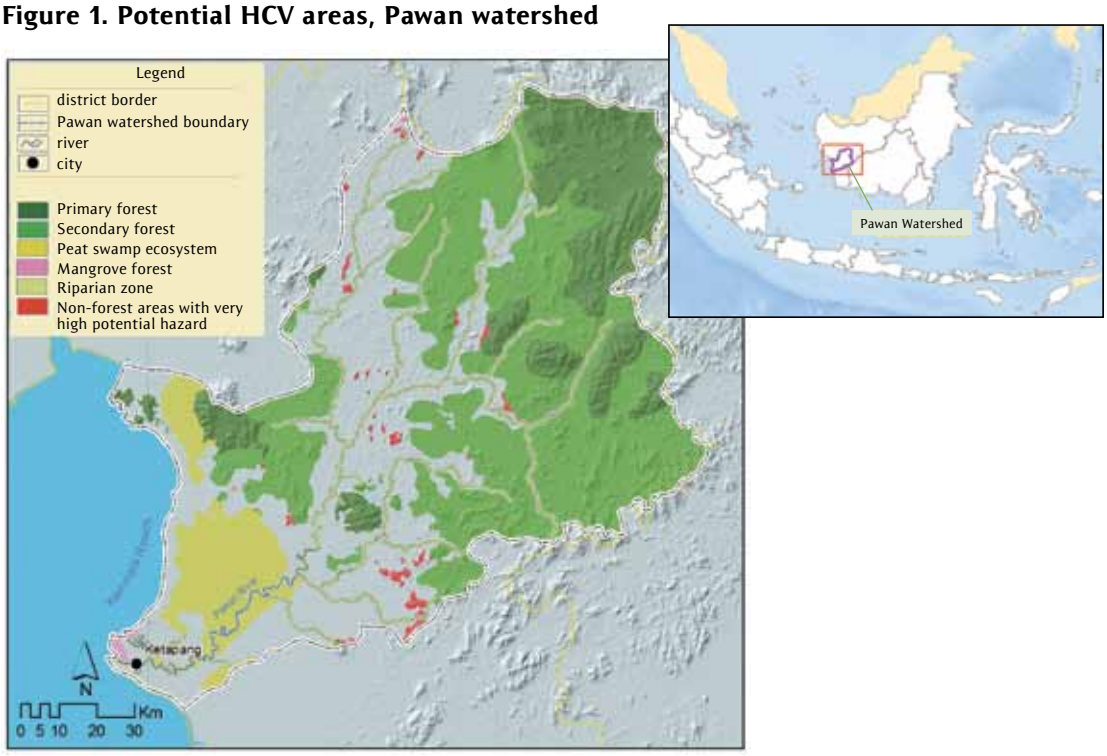
Table 1. Revised High Conservation Values for Indonesia

HCV 1	Areas with important levels of biodiversity	
	HCV 1.1	areas that contain or provide biodiversity support function to protection or conservation areas
	HCV 1.2	critically endangered species
	HCV 1.3	areas that contain habitat for viable populations of endangered, restricted range or protected species
	HCV 1.4	areas that contain habitat of temporary use by species or congregations of species
HCV 2	Natural landscapes and dynamics	
	HCV 2.1	large natural landscapes with capacity to maintain natural ecological processes and dynamics
	HCV 2.2	areas that contain two or more contiguous ecosystems
	HCV 2.3	areas that contain representative populations of most naturally occurring species
HCV 3	Rare or endangered ecosystems	
HCV 4	Environmental services	
	HCV 4.1	areas or ecosystems important for the provision of water and prevention of floods for downstream communities
	HCV 4.2	areas important for the prevention of erosion and sedimentation
	HCV 4.3	areas that function as natural barriers to the spread of forest or ground fire
HCV 5	Natural areas critical for meeting the basic needs of local people	
HCV 6	Areas critical for maintaining the cultural identity of local communities	

Source: www.hcvnetwork.org/resources/national-hcv-interpretations/Toolkit%20HCVF%20English%20version_final-26Jan10.pdf.

The study started by assessing potential HCVs, especially HCVs 1 to 4. HCVs were identified through interpretation of secondary data (topographic map, land system maps, etc.) and existing land cover (based on Landsat imagery interpretation), and supported by ground-truthing. The resulting map (Figure 1) was then used as a reference to evaluate the actual HCV (those areas defined and managed by government as conservation/protected areas and by the private sector as HCV areas).[4] To understand how HCVs are identified in the private sector, seven HCV reports of oil-palm plantation management units (70,314 ha) were analyzed. The findings were used to extrapolate the proportion of HCV areas to the 24 oil-palm concessions (623,228 ha) in the catchment. The findings were used to extrapolate the proportion of HCV areas to the 24 oil-palm concessions (172,281 ha) and 16 forest concessions (450,947 ha) in the catchment.

Figure 1. Potential HCV areas, Pawan watershed



Potential HCV

Identifying potential HCVs at the landscape level supports management at the landscape level. The potential HCVs were defined as remaining primary forest, secondary forest, peat swamp forest, mangrove forest, riparian ecosystems and non-forested areas with a high erosion risk. The latter, mostly areas with steep slopes, require extra care to prevent negative environmental impacts. Through land-cover analysis using GIS and ground-truthing the total areas with potential HCV was estimated to be 980,477 ha, or 69% of the catchment area (Table 2).

Table 2. Potential HCV areas

HCV	Area (ha)	% of total area
Primary forest	223,693	23
Secondary forest	534,694	54
Peat swamp forest	105,469	11
Mangrove forest	3,197	1
Riparian zone	101,235	10
Non-forest area with very high erosion risk	12,189	1
Total	980,477	100

Peat swamp forest is located in the lowland areas. It is mostly composed of forested areas and contains endangered species. The ecosystem still effectively regulates water and prevents fire. Secondary forest is found on gently and steeply sloped terrain in the middle and upper catchment areas. The remaining primary forest area is found in the lower, middle and upper parts of the catchment areas; since access is difficult, logging is not technically or economically feasible. Riparian zones have good vegetation cover and function as ecological corridors that connect HCV areas among upper, middle and lower catchment areas. Non-forested areas with steep slopes have a high risk of erosion. Most of the mangrove forest has been converted into fish ponds.

Actual HCV

The actual HCVs in the landscape consist of protected areas managed by the government and areas managed by private enterprises as part of concessions. The total area of actual HCVs managed by the government is 349,733 ha, or 25% of the catchment area. It includes Gunung Palung National Park, watershed protection forest,[5] peat swamp ecosystem, riparian zone and non-forested areas with a risk high of erosion (Table 3).

Table 3. Existing HCV areas identified and managed by government

HCV area	Area (ha)
National park forest	61,390
Primary forest	22,199
Secondary forest	26,487
Peat swamp ecosystem	12,704
Watershed protection forest	237,519
Primary forest	129,034
Secondary forest	106,377
Non-forest area with very high erosion risk	2,109
Peat swamp ecosystem	28,378
Riparian zone	22,446
Total	349,733

HCVs in private concession areas

A case study was made of seven oil-palm concessions and five forest concessions in the Pawan watershed that had already identified and defined their HCV areas. Table 4 compares the potential and actual HCV areas in both types of management units.

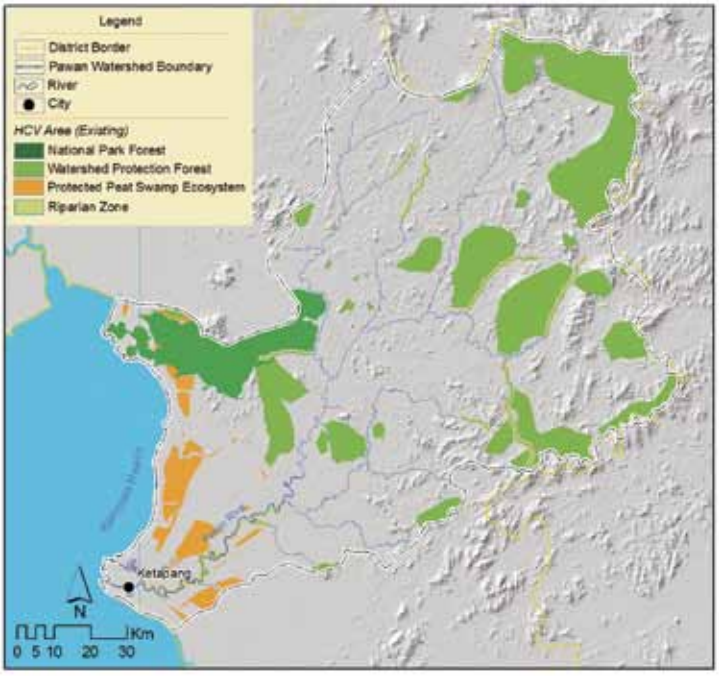
Table 4. Potential and actual HCV areas (ha) in private concession areas

HCV area	Oil-palm plantations		Natural forest concessions	
	potential	actual	potential	actual
Primary forest	0	0	24,876	14,147
Secondary forest	10,150	0	30,465	26,178
Peat swamp ecosystem	6,348	572	0	0
Riparian zone	10,219	1,495	10,581	912
Non-forest area with very high risk of erosion	1,100	0	0	0
Total	27,817	2,067	68,183	41,238

Note: Potential and actual HCV areas as identified and managed by seven oil palm plantations and five natural forest concessions.

Assuming that there are no differences in interpretation between potential and actual HCV areas, and no actual HCV areas have been delineated outside potential HCV areas, actual government-managed HCV areas cover about 36% of the potential HCV area in the total catchment (Figure 2). Identified and managed HCV areas in oil palm plantations and natural forest concessions represent 7% and 60% of the potential HCV areas, respectively. Extrapolating this to the overall concession areas, this (potentially) would add 160,543 ha (5,073 ha in oil palm plantations and 155,470 ha in forest concessions) to actual HCV areas. This would make the total actual HCV 510,276 ha, or 52% of potential HCV areas (36 % of the catchment area).

Figure 2. Actual HCVs managed by government, Pawan watershed



Conclusions

Based on a spatial analysis of remote sensing, supported by ground-truthing, the actual HCV of the study catchment is 52% of the potential HCV. Of all potential HCVs, 64% are under the control of private concessions; 36% are managed by government.

The relatively large gap between actual and potential HCV and the high proportion of potential HCV managed by the private sector is cause for concern. It indicates a high risk of losing HCVs. Ineffective land-use policy is partly caused by the absence of an LCP process prior to the establishment of concession areas.

Determining HCVs is crucial to maintaining life support systems at the landscape level. It is part of a precautionary approach to prevent catastrophes — such as fires, water scarcity and pests — caused by unsustainable natural resource exploitation. Unfortunately, the benefits of the HCV approach are often not perceived by government and concession holders, who tend to have short-term commercial perspectives. HCV areas are often considered a "green" strategy rather than a business consideration. A fundamental shift in the attitude of concession owners is needed so that they see HCV as a source of revenue rather than a cost or a threat to profitability.

The HCV areas within management units should be connected to one another to form conservation corridors. In many cases, the HCV areas are discrete small islands in a sea of intensive production. This reduces the effectiveness of HCV to contribute to landscape-level conservation initiatives. The government should ensure the connectivity of HCV areas among concession boundary areas. It can do this by developing LCP as the basis for delineating natural corridors at a landscape level before issuing concession areas permits.

Endnotes

1. These are the ten FSC principles: 1: Compliance with laws and FSC Principles; 2: Tenure and use rights and responsibilities; 3: Indigenous peoples' rights; 4: Community relations and worker's rights; 5: Benefits from the forest; 6: Environmental impact; 7: Management plan; 8: Monitoring and assessment; 9: Maintenance of high conservation value forests; and 10: Plantations.
2. See www.hcvnetwork.org/about-hcvf.
3. These are known as *Hak Pengusahaan Hutan or* HPH in the Indonesian concession system.
4. HCV actual equals HCV at the present (existing) condition and includes both those areas that are managed by government (in the form of conservation/protected areas) and by the private sector (HCV areas).
5. These are known as *Hutan Lindung* in Indonesia.

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5.6 Planning for social justice

GAMMA GALUDRA, SÉBASTIEN DE ROYER, PUTRA AGUNG and UJJWAL PRADHAN

Introduction

Inclusive development as a concept was introduced in response to a market expectation that development would follow from economic growth through a trickle-down effect. In fact, economic growth by itself can lead to massive unemployment and growing inequality. This led scholars and policy-makers to conclude that civil and political rights must be ensured in the development process (Sachs 2004; Chibba 2008).

The idea of inclusiveness became a key goal. However, the question of how inclusive development can be used in landscape planning has not been answered.

By analyzing recent changes in Indonesia, this article shows that the use of social safeguards in spatial planning can support change through inclusive development at the landscape level. Going beyond mere compliance with internationally agreed social safeguards and standard mechanisms — such as the UN-REDD programme and the Forest Carbon Partnership Facility (FCPF) of the World Bank — the World Agroforestry Centre (ICRAF) tried to integrate social inclusiveness into a comprehensive approach to land-use and spatial and development planning for low-carbon development.

THE USE OF SOCIAL SAFEGUARDS IN SPATIAL PLANNING CAN SUPPORT CHANGE AT THE LANDSCAPE LEVEL.

Embedding social justice dimensions into spatial planning and using globally consistent approaches to the recognition and participation of indigenous peoples and local stakeholders is likely to affect a wide range of right-holders. This helps address the requirement that a well-functioning landscape integrate not only development objectives and environment but social justice and equity for socially vulnerable people as well.

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Spatial and development planning in Indonesia

Previously, spatial and development planning mainly promoted economic growth. It was less concerned with environmental issues and social aspects, despite continuous debates and conflicts on these matters. Indonesia responded with shock and denial when it was ranked as the third-largest global emitter of greenhouse gas (GHG), 80% of which came from deforestation, peat and forest degradation (PEACE 2007). It became clear that the underlying causes of deforestation and degradation were found in a political economy that gave priority to economic development during spatial planning processes, and in the fact that powerful interest groups benefitted financially from resource depletion (Dewi et al. 2011). The hope arose that planning for low-carbon development and a green economy could become a tool to achieve sustainable development.

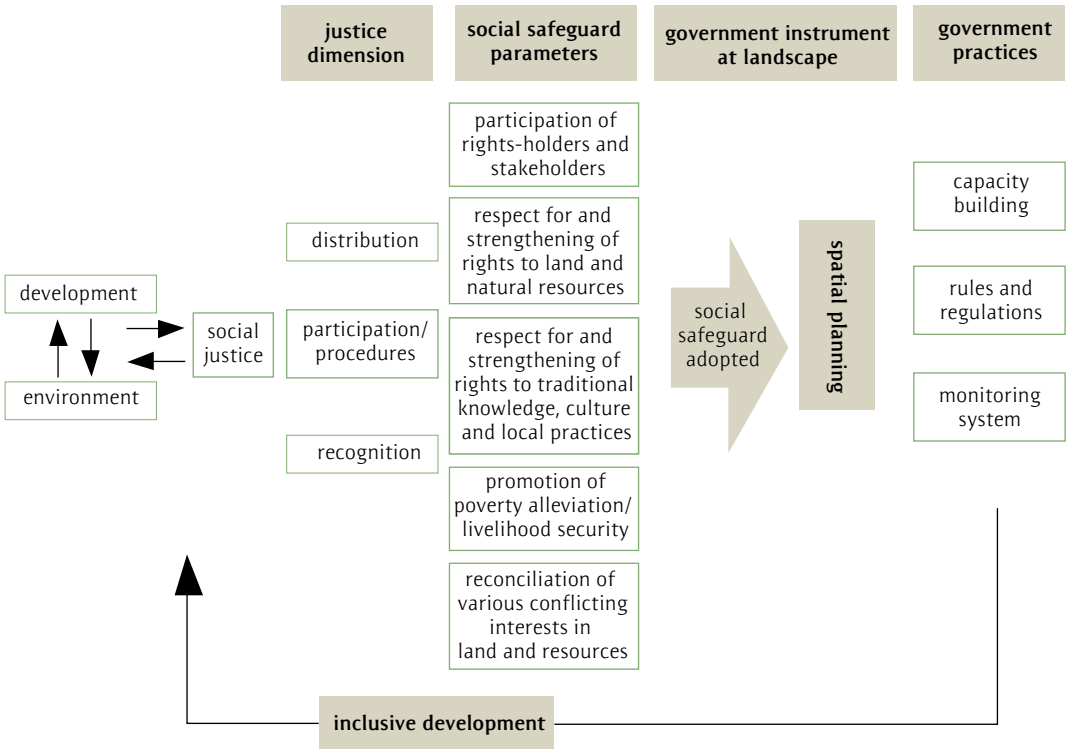
In Indonesia's Soeharto era (1965–98), mainstream, market-based development led to large-scale land grabbing for mono-crop production and to the marginalization of local communities in favour of large enterprises. Land tenure conflicts and the eviction of local communities and indigenous people from their traditional livelihoods and lands were frequent, due to the allocation of permits to well-connected private-sector stakeholders through top-down spatial and development planning. The policies of decentralization in the reformation period after 1998 provided only small adjustments; in fact, it increased payoffs to local elites. Due to the lack of transparency and accountability during spatial and development planning processes, powerful interest groups could easily take advantage of forest conversion and permit allocations. Lack of participatory and inclusive consultation also led to the exclusion of local people and their knowledge. This resulted in plans that were not appropriate to local circumstances, despite the inclusion of sustainable development and local decentralization concepts.

Spatial and development planning processes should ensure that rights to use land and forest resources are not altered and that local communities and indigenous people can participate. It was vital to establish a system that supported these goals and a process of participatory consultations and inclusiveness of the myriad stakeholders, including local communities. It is hoped that the inclusion of social safeguards in spatial and development planning processes will reconcile development with concepts of social justice towards landscape planning for the benefit of historically marginalized rights-holders.

Social safeguards as social justice in spatial and development planning

The concept of social safeguards was developed in the 1980s and incorporated into several international policies, such as those guiding the World Bank's large-scale infrastructure investments (Ros-Tonen, Insaidoo and Acheampong 2013). The concept has been internationally accepted in the context of efforts to reduce emissions from deforestation and forest degradation, or REDD+ (Jagger et al. 2012). It responds to concerns about centralized forest governance, a lack of engagement by local communities in decision-making and REDD+ benefits, loss of customary tenure and use rights for local populations and lack of respect for local culture and knowledge (Phelps, Webb and Agrawal 2010; Phelps et al. 2010; Lyster 2011). ICRAF adopted the concept of social safeguards and its parameters in spatial and development planning processes in select areas of Indonesia (See Figure 1).

Figure 1. The process of adopting social safeguard parameters



In Indonesia the Climate, Community and Biodiversity Alliance (CCBA) and CARE International are developing the parameters of social safeguards in the context of REDD+ under the FCPF, the UN-REDD Programme and the REDD+ Social and Environmental Standards (REDD+ SES). Safeguards have three social justice dimensions: distribution; participatory/procedural; and recognition (Sikor 2013):

- distribution concerns the way costs and benefits are allotted among people and groups with competing claims;
- participatory or procedural dimensions focus on the process of decision-making and include the recognition of competing ideas and interests, the ability to participate, the distribution of power and rules on decision-making; and
- recognition refers to acknowledging people's ideas, culture and histories and avoiding any bias toward statutory norms (Page 2006; Schlosberg 2007).

The use of social safeguards is necessary due to the lack of security in land tenure systems and the unfairness of control over and access rights to natural resources in Indonesia. It encompasses the fair distribution of benefits and the need for greater diversity among stakeholders and the transfer of property rights (Forsyth and Sikor 2013; Sikor 2010). Advocacy on behalf of indigenous peoples has emphasized the recognition of their identities and histories of exclusion, calling for the right to self-determination in certain

extreme cases. Nevertheless, justice cannot be delivered simply by applying "naturally" existing rights and distributing them in an equitable manner. It also requires understanding whose claims matter (Sikor 2010).

The initiative incorporated three social justice dimensions into five social safeguard principles (Table 1). These elaborate in detail the social dimensions of the ten principles of the landscape approach by Sayer et al. (2013).

Table 1. Social justice dimensions of social safeguard principles

Social justice dimension		
Distribution	Participation/procedural	Recognition
Promoting poverty alleviation and livelihood security through land-use planning maintains social benefits through the recognition of ecosystem services, diversifies income activities through investment planning, and promotes fair distribution of benefits	Effective participation improves the quality and acceptance of land-use planning through the effective involvement of all stakeholders and rights-holders and respects their various interests while improving community participation through the dissemination of information	Respect for and strengthening of the rights of all land users to land and natural resource uses reconciles public interest, reduces poverty and social inequality and promotes social stability, while acknowledging greater diversity among stakeholders. One of its goals is reconciliation of unfair control and access rights to land and natural resources
	Reconciling various conflicting interests in land and resources reduces violence and conflicts and reduces risks for investments while recognizing greater diversity in stakeholders' aspirations	Respecting and strengthening rights over traditional knowledge, culture and local practices increases the acceptance and integration of spatial planning while recognizing people's identities experiences and values

Key findings: practical experience in Papua, Indonesia

Landscape and social dynamics

Special autonomy for Indonesia's Papua Province was sanctioned by *Law No. 21/2001*. The law gives the provincial government full authority to regulate and manage the interests of the Papuan people according to their aspirations and traditional rights. Despite the law, however, a large number of deforestation-related and social conflicts occurred; development planning continued to promote only economic growth, with benefits distributed mainly among elite groups (Papua REDD+ Task Force 2013). The legal reform did not entail any meaningful changes in the way that development planning and implementation were carried out. The report of the REDD+ Task Force also shows

a tenfold increase in planned and unplanned deforestation in Papua, from 68,695 ha in 2003–06 to 728,416 ha in 2006–09 (ibid.). This was due to an increase in forest concession permits for large-scale private companies and small-scale community forestry enterprises, and to agricultural expansion for food crops. The report also described the social vulnerability of Papuan people. Of nearly three million people, 84% depend on forests for their livelihoods, including social and cultural benefits (ibid.). Social conflicts can easily erupt if development planning does not consider Papuan peoples' dependency on the forest.

Jayapura and Jayawijaya districts, Papua, Indonesia

The use of social safeguards in spatial and development planning processes is being piloted by ICRAF and its partners — *Yayasan Lingkungan Hidup* and *Yayasan Kajian Pembangunan Masyarakat* — in the Province of Papua, Indonesia, with assistance from the European Union. The governor of the province has recognized the importance of social safeguards in spatial and development planning processes and has expressed the support of the provincial government for conserving biodiversity and cultural diversity. It is hoped that the active role of local communities in these processes that is proposed by the provincial government will secure a more just approach to resource management in Papua.

ICRAF and its partners organized multi-stakeholder workshops in September 2013 and February 2014 in Jayapura and Jawijaya districts. The workshops involved local government officials and representatives of NGOs, private businesses and local and indigenous communities. The objective was to raise awareness among the various actors of social safeguards and the importance of integrating them into spatial planning and development planning processes. The workshops also aimed to develop participatory and context-specific social safeguard criteria and indicators, based on the social safeguard's principles for the districts of Jayapura and Jayawijaya (Table 1). Participants explored how these social safeguards could be implemented during the planning processes, and what policy changes were required to support their implementation and monitoring; some examples of mechanisms are provided in Table 2.

Table 2 shows that some social safeguard mechanisms are already operational and have supporting policies at the district level. They can be used for spatial and development planning processes, such as work on mapping customary (*adat*) land, territories and livelihoods based on *Bupati* (head of the district), Jayapura and Jayawijaya's decrees to support the principle of respect and strengthening of rights to land, territories and natural resources. Table 2 also lists some changes required, such as mechanisms for dispute resolution in the acceptance of the development plans and the provision of grievance mechanisms if the communities' needs and concerns are not met. Policies and regulations at the district level are necessary to support the change envisioned in these social safeguard mechanisms. Advocacy from civil society will be important in making these policy changes. In the case of the two districts, the political will for adopting the social safeguards has been secured; this should be accompanied by the stakeholders' understanding of the benefits of these safeguards.

Table 2. Adopting social safeguards, Jayapura and Jayawijaya districts (examples)

Social safeguard principles	Enabling conditions	Implementation mechanism	Changes/innovation
Participation of rights-holders and stakeholders in development planning	Participation of rights-holders and stakeholders in land-use planning processes	Bottom-up discussion on planning and development *(Musrenbang)* from village to district level	Transparency in negotiated planning and development; community monitoring mechanism and capacity building
Transparency and rights to information	Information dissemination on land-use planning	Bottom-up planning and socialization of District Land-Use Planning (RTRWK)	Mechanism of dispute resolution in development plans; grievance mechanism
Respect for and strengthening of rights to land, territories and natural resources	Recognition and security of community rights over land, including conflict resolution	*adat* (customary) mapping of land, territories and livelihoods through the head of district decree	(not required)
Promotion of reconciliation of various conflicting interest over land and resources	Reconciliation of various conflicting interests	*adat* (customary) reconciliation mechanism *(para-para adat)*	Mechanism of dispute resolution in development plans; grievance mechanism

Identifying existing rules and agreeing on locally defined parameters have helped ensure that no stakeholder group is left out of the multi-stakeholder processes. This is a good first step toward a more inclusive planning process.

Conclusions

Social safeguards can be used to transform policies on inclusive development at the landscape level. The multi-stakeholder processes undertaken in Jayapura and Jawijaya in revising and adapting criteria and indicators to local conditions have ensured that social safeguards are considered and that they support the understanding and ownership of rights-holders and stakeholders. These processes also facilitated discussions that support trust and consensus building among the diverse stakeholders who share the same landscape.

It will be important to establish stronger ownership on the part of the task force to ensure balanced oversight in the use of social safeguards, including review and approval of local specific indicators and the assessment and monitoring process. It will be crucial to establish a monitoring plan that clearly defines the scope of information needed, where it is found and how it will be gathered, and that identifies responsibilities for these tasks.

One of the biggest challenges is to ensure that social safeguards are incorporated in the policies, legislation and regulations for land-use planning. It is also important to identify the processes and procedures that are essential to implement social safeguards.

Inclusiveness is the key factor. Economic growth and environmental protection must not marginalize the rights of communities and indigenous peoples, and spatial and development planning must take into account the voices of these vulnerable people. In line with post-Suharto political reforms, which centred on decentralization and devolution, spatial and development planning now has to be inclusive, and must ensure that social safeguards are integrated in order to effect changes at the landscape level.

Work on social safeguards must consider all groups in society. The local community may be heterogeneous. People such as migrants may become increasingly vulnerable if initiatives focus on indigenous people's right to self-determination. Private companies may well be anxious if encroachments by local people, in the name of human rights, cannot be controlled. For inclusive development to take place, the first step is for multiple stakeholders to be involved in the design of social safeguard parameters to ensure that all concerns are taken into consideration. Social justice means including vulnerable people and others during the design of social safeguards.

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Established in 1991, the European Tropical Forest Research Network (ETFRN) aims to ensure that European research contributes to conservation and sustainable use of forest and tree resources in tropical and subtropical countries.

ETFRN promotes a dialogue between researchers, policy-makers and forest users, the increased coherence of European tropical forest research, and increased collaboration with researchers in developing countries through partnerships and other forms of capacity building.

ETFRN News comprises theme-based issues on topics relevant to the international development agenda. This issue o*f ETFRN News* provides an overview of practical experiences with and research on productive landscapes. Published in conjunction with volume 30.3 of *Farming Matters*, Farmers in Their Landscapes, it results from a partnership initiative between Tropenbos International and the Centre for Learning on Sustainable Agriculture (ILEIA) on the theme of landscapes.

The mission of Tropenbos International (TBI) is to improve tropical forest governance and management in order to support conservation and sustainable development. By making knowledge work for forests and people, TBI contributes to well-informed decision making for improved management and governance of tropical forests. TBI's longstanding local presence and ability to bring together local, national and international partners make it a trusted partner in sustainable development. TBI is ETFRN's coordinating member and national focal point in the Netherlands.

ILEIA facilitates practice-based knowledge sharing on sustainable family farming. It publishes a global magazine, *Farming Matters*, which is read in more than 150 countries. ILEIA is also the secretariat of the global AgriCultures Network, which has active members and allies in Asia, Africa, Latin America and Europe. For more information, go to www.agriculturesnetwork.org.

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