ISSN 1022–5439

ITTO Tropical Forest UPDATE

Volume 18 Number 2 2008

A newsletter from the International Tropical Timber Organization to promote the conservation and sustainable development of tropical forests

Strengthening diversity

ELEVEN YEARS AGO an article published in *Scientific American* sent shock waves through the tropical forestry community. Entitled *Can Sustainable Management Save Tropical Forests?*[1], the article made a compelling case for the failure of sustainable forest management (SFM) in the tropics, primarily in terms of its inability to (up to that point in time) safeguard tropical forests' immense biodiversity. The authors of the paper concluded that the efforts by many countries and organizations (including ITTO) to promote SFM and associated measures like reduced impact logging (RIL) had essentially been a waste of time and money, proposing instead that a system of protected area 'set asides' be established in inaccessible or uneconomic areas outside commercial logging concessions.

A decade later another article in the prestigious journal *Nature* entitled *A Logged Forest in Borneo is Better than No Forest at All*[2] argued that in the face of increased threats to tropical forests from plantation crops like oil palm, properly logged forests were a key element in helping to ensure biodiversity conservation in the tropics.

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The *TFU* is distributed **free of charge** to over 15 000 individuals and organizations in more than 160 countries. To receive it, send your full address to the editor. Please notify us if you change address. The *TFU* is also available on-line at www.itto.or.jp

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Cover image Jaguar (*Panthera onca*) patrolling a forest road in Iwokrama, Guyana. *Photo: Fotonatura*

... Editorial continued

It will be no secret to regular readers of the *TFU* what side of this argument ITTO is on. In fact it is probably misleading to imply that there is still any argument over the issue. Virtually all observers now agree that SFM can, when properly implemented, play a key role in helping to conserve non-timber forest values, including biodiversity. The key phrase, though, is "properly implemented". This has always been the weak link in tropical forestry and remains so today. It is why ITTO and others have dedicated significant resources to promoting SFM and training tropical foresters how to apply the principles and practices that help to maintain healthy and vital forests.

A key contribution of ITTO has been its policy development program, through which a series of guidelines have been formulated to provide developing countries (some of which had no forest management at all let alone sustainable management up until a decade or two ago) with a framework for introducing sustainability into their forest sectors. This issue of *TFU* summarizes a complete revision of one of ITTO's earliest efforts under this program, the *Guidelines on the Conservation of Biodiversity in Tropical Production Forests* (p. 3). Soon to be jointly published with partners the World Conservation Union (IUCN), the new Guidelines will provide an essential reference to countries trying to balance the twin goals of forest-based development and conservation, sending the key message that timber harvesting when done well is part of the solution to conserving tropical forest biodiversity.

As with its other policy initiatives, ITTO will make resources available to assist countries to implement the new Guidelines. This will include training workshops and other activities to be carried out with IUCN, as well as continuing to promote biodiversity-friendly harvesting techniques like RIL. Several studies of forests harvested under RIL regimes are now available (e.g. p. 7) and virtually all show the beneficial effects of RIL on biodiversity and other forest values when compared to conventional logging, with some values being comparable to or exceeding those of pristine forests.

Perhaps the most important components of forest biodiversity to be considered when developing management plans are the people living in and around the forest. Plans to strengthen and sustain forest biodiversity are doomed to failure unless the human element is taken into account. As illustrated by one ITTO activity in Congo (p. 13), local communities can relatively quickly make the transition from exploiting to protecting wildlife and other biodiversity, although careful management of expanding wildlife populations can be required to minimize conflicts with local populations.

While there is no doubt that the establishment and management of protected areas will remain a key component of biodiversity conservation strategies in tropical countries (as evidenced by ITTO's large and expanding program to establish and manage transboundary conservation reserves and other protected areas), it is equally certain that large areas (usually the majority) of forests in most countries will be earmarked for development and forest management. While new funding which may become available for tropical forest protection through on-going climate change negotiations or other sources may alter this equation in some countries, at the pan-tropical level it is unlikely to change dramatically any time soon. ITTO will therefore continue working with its partners to ensure that forest-based development in tropical countries is sustainable, thereby strengthening the diversity on which the future of their forests depends.

Steve Johnson

[1]Rice, R.E., Gullison, R.E. and Reid, J.W. 1997. *Can sustainable management save tropical forests?* Scientific American 276: 44-49.

[2]Meijaard, E. and Sheil, D. 2007. *A logged forest in Borneo is better than none at all.* Nature 446: 974.

Updating the ITTO Biodiversity Guidelines

ITTO and IUCN collaborate to produce new guidelines for conserving biodiversity in production forests

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Needs protecting: The splendid leaf frog (*Cruziohyla calcarifer*), like other tropical amphibians, is endangered by loss of habitat, environmental change and disease. *Photo: Fotonatura*

THE INTERNATIONAL Tropical Timber Council adopted its current *Guidelines on the Conservation of Biological Diversity in Tropical Production Forests* in 1993. This was at a time when tropical forest biodiversity was just emerging as an issue of global concern. The Guidelines were produced just after the Earth Summit at Rio de Janeiro in 1992 when the Convention for the Conservation of Biological Diversity (CBD) was adopted.

But a great deal has happened since 1993. The CBD has continued to give emphasis to conservation of biodiversity in managed tropical forests and in 2000 adopted its 12 principles for the ecosystem approach to biodiversity conservation (*Ecosystem Approach Principles*). These set biodiversity conservation in the context of local developmental needs and stress the importance of maintaining ecosystem functions, achieving sustainable economic benefits, exploiting local and traditional knowledge and looking at landscape-scale issues in managing natural systems. More recently the CBD has adopted the *Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity*. These are consistent with the principles of Sustainable Forest Management (SFM) as defined by the UNFF and ITTO and in the various criteria and indicators (C&I) for SFM formulated by ITTO and others.

The emergence and ongoing debate on forest certification has had major significance for biodiversity in production forests. There are now a number of global, regional and national certification initiatives and all of them give attention to the need to conserve biodiversity in any forests that are to be recognized as being sustainably managed.

Revision process

IUCN and ITTO collaborated throughout the process of the revision of the Guidelines. The starting point was that they complement other ITTO Guidelines covering different aspects of the management of tropical forests. These existing ITTO Guidelines aim to promote the overall improvement of the management of natural tropical forests, plantations, restored and rehabilitated forests and fire prone forests and they all address issues of importance for biodiversity conservation. However, they do not specifically focus on biodiversity. The Biodiversity Guidelines are therefore intended to bring together in one place those specific actions that are needed to improve biodiversity conservation in tropical production forests.

The revision process aimed to involve as many as possible of the other organizations that have expertise in forest biodiversity and share the conservation goals of ITTO and IUCN. A technical panel was convened including representatives of the CBD, FAO, UNESCO, WWF and ITTO member countries. A revised set of Guidelines were drafted by the panel. These were then translated into French, Portuguese and Indonesian and, following a decision taken by the ITTC, were subjected to field testing in Guyana, Cameroon, Brazil and Indonesia. Field testing involved collaboration with harvesting companies in their field operations to find out just how realistic and practical the Guidelines were. Economic studies helped to establish how much implementation would cost and examined options for incentives to encourage companies to implement the

Guidelines. National workshops were held in the four test countries.

An expert panel was then convened to further revise the Guidelines and incorporate all the learning from the field testing. The revised Guidelines were then presented to the Council and further revisions proposed by members have now been incorporated. The Guidelines will be submitted for final approval by the Council at its November 2008 session. Plans are now being laid for a major effort to promote implementation of the Guidelines in member countries over the coming years.

Changes from earlier Guidelines

The widespread recognition that there is no single best way of managing forests is a significant change that has occurred since 1993. The main message of the CBD's *Ecosystem Approach Principles* was that all situations are different and that there are multiple ways of managing forests that can be considered sustainable and all of which have impacts on biodiversity. The CBD *Ecosystem Approach Principles* themselves take as their starting point the notions that biodiversity conservation approaches have to be a matter of societal choice and that decisions should be decentralized to local stakeholders to the extent that this is possible.

The new Guidelines emphasize the need for forest managers to acquire the skills needed to make good decisions about how and when to take measures in favor of biodiversity. There is no point in making large increases in costs to conserve biodiversity that is of little interest or has limited value. Investments have to be appropriate to the scale of the problem. Thus protecting gorillas in harvested forests in Central Africa is a good investment. Some of the forests where testing took place in Indonesia had limited special biodiversity value and simply observing existing regulations and good logging practices was found to be sufficient.

The new Guidelines emphasize the need for forest managers to work more closely with conservation organizations —these organizations are sources of knowledge and also strategic partners in gaining broader public acceptance of the biodiversity values of well managed forests. The Guidelines also stress the need for larger scale landscape approaches—looking at managed forests in the broad context of protected areas and non-forest areas. The Guidelines also stress the importance of planted forests for biodiversity. Examples are given of large scale plantations that have been managed in ways that contribute to biodiversity conservation.

Production forests for biodiversity

Tropical forests contain more species than any other biome and a high proportion of these species are threatened. However, less than 10% of tropical forests are in effectively managed protected areas; 90% are subject to some form of extractive use or are destined for conversion to non-forest uses. A significant proportion of this 90% is, or is likely to be, subject to timber harvesting or to conversion to tree plantations. These managed production forests offer huge potential for biodiversity conservation. A recent IUCN Global Species Assessment states that "… for many species the habitat degradation that accompanies selective resource exploitation, or that occurs in habitats next to cleared areas, can have serious negative consequences". However, there is abundant evidence that logged forests can continue to make important contributions to biodiversity conservation objectives. A recent paper in the journal *Nature* entitled *A logged forest is better than no forest at all* argued strongly for the role of logged forests in biodiversity conservation. Various categories of managed production forest are essential for the survival of many species of fauna and flora.

The goal of the Guidelines is to help foresters respond both to the gravity of the potential threats to biodiversity from forestry activities and also to the opportunities that forests provide to make positive contributions to biodiversity conservation. Bad forest management may be one of the world's greatest threats to biodiversity, but good forest management can provide a major contribution to conserving this biodiversity. The Guidelines attempt to set out how positive outcomes for biodiversity can be achieved in the management of tropical production forests, through a planning process as illustrated in *Figure 1*.

Objectives of the Guidelines

The overall objective of the Guidelines is to promote the conservation of native animal and plant species in tropical production forests. It is also to ensure that those elements of biodiversity that are important in the functioning of forest ecosystems and in the livelihoods of local communities are maintained. The Guidelines seek to promote understanding of how a healthy balance of these elements can be achieved at the level of nations, regions, landscapes and forest management units. The specific objectives are therefore to achieve:

1. an enhanced role for tropical production forests as components of multi-functional landscapes that contribute to native biodiversity conservation at different spatial scales;
2. equitable distribution of the costs and benefits of biodiversity conservation in tropical production forests;
3. improved understanding of the impacts of forest management on biodiversity;
4. adaptation of forest management practices at all spatial scales to favor the conservation of native biodiversity;
5. improved ecological processes in tropical production forests provided by the presence of locally adapted native biodiversity; and
6. improved practical forest management at all spatial scales aimed at retaining native biodiversity.

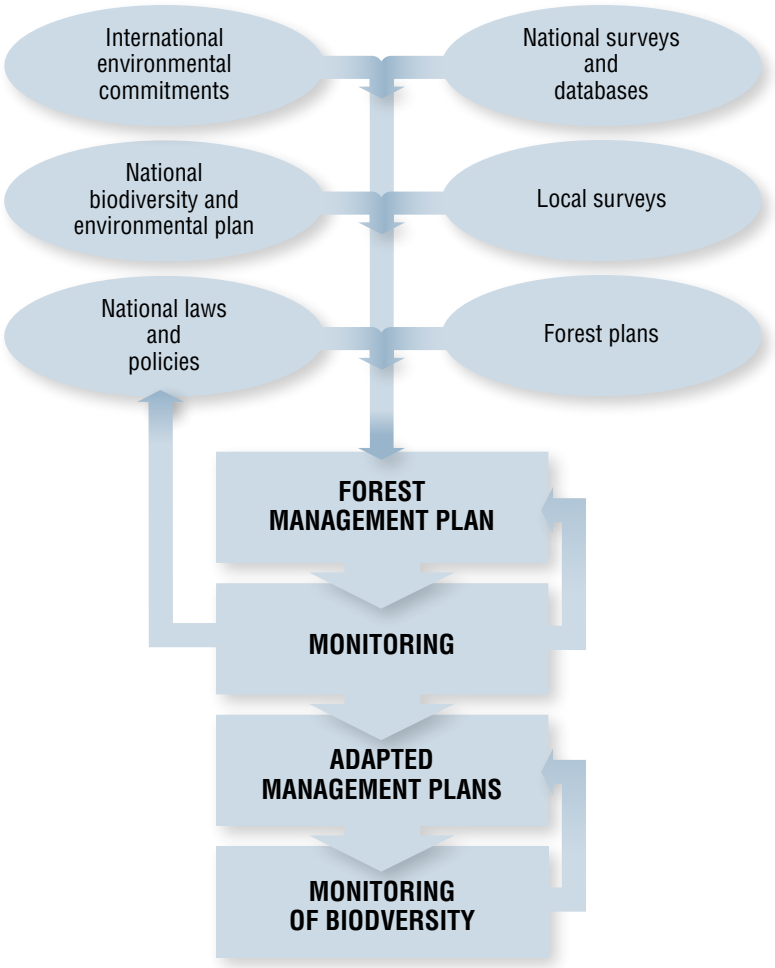
The Guidelines should not be viewed simply as a list of 'boxes to be ticked' by forest managers but rather a source of understanding and as a mechanism for disseminating the experiences that have been gained in recent years. The aim of the Guidelines is to motivate and not to regulate.

What to conserve and how to conserve it

Biodiversity is defined by ITTO as the *variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes*

Planning for diversity

Figure 1: Actions to achieve forest biodiversity conservation in production areas



diversity within species, between species and of ecosystems. Most tropical forests contain so much biodiversity that it is impossible to explicitly monitor and manage everything; choices are necessary. Crucial questions are what aspects are priorities for protection within logged forest, then how this might be achieved, and how to monitor whether this is happening in particular cases.

Some believe that all biodiversity should be maintained. Others argue that, as long as forests continue to provide required goods and services, some loss of biodiversity is tolerable. Global conservation interests emphasize threatened species, charismatic species and the biodiversity with actual or potential utility (such as wild crop relatives). Local people, and regional populations, have needs and priorities of their own.

Many people depend on forest landscapes for a significant proportion of their needs. For many of these people, biodiversity is about eating, staying healthy, and finding shelter. Depleting the resources on which these people depend (or making them inaccessible) can add to their hardship. Priority setting must recognize and engage with the views and needs of these people: especially the marginalized poor and vulnerable.

All these differing perspectives should be heard. Ultimately what to conserve at what cost is a decision for society as a whole. Different societies with different cultural values and at different stages of economic and social development will inevitably make different choices on their biodiversity conservation strategies and priorities.

Timber harvesting inevitably leads to changes in biodiversity; ideally these changes should be recognized and accepted before harvesting commences. Trade-offs between costs and profit on the one hand and biodiversity gains and losses on the other should be recognized explicitly and the selection of alternative strategies and scenarios negotiated between stakeholders. Planning and negotiation should seek achievable conservation outcomes with acceptable costs.

Foresters have long recognized that any comprehensive effort to address the concept of 'sustainability' needs to consider numerous ecological interactions such as the pollination, seed dispersal and symbiotic relationships on which the productive forest depends. Many timber species, particularly in the tropics, depend on animals for pollination and dispersal. In these cases knowledge is often limited; for example, we remain uncertain which animal species are responsible for pollinating many timber species.

Just because a species remains present after timber extraction does not guarantee its long-term viability. For example, trees may live for many centuries despite not being able to regenerate. Seen in this light a decline in any species becomes a potential cause for concern.

Research in all tropical regions has suggested various ways in which the biodiversity impacts of forest management might be mitigated. Any measures reducing forest damage are likely to be beneficial. Many such measures are already incorporated in various aspects of sustainable forest management and good practice such as reduced impact logging, but more can often be done. Biodiversity-beneficial measures include recognizing and protecting important habitat structures (such as large trees, hollow trees, dead stems and fruiting species) and locations (special habitats such as pools, wallows, salt-licks, edible clays, caves, and river-side habitats offering nesting habitats). Reducing timber extraction rates and lengthening recovery periods will reduce the overall impact of harvesting on the forest. While some options are costly others can reduce costs such as when measures such as climber cutting, understory clearing, or elimination of specific species are limited to situations where they are demonstrably needed. Roads have numerous direct and indirect impacts that can be reduced through good planning, engineering, maintenance and enforcement.

Principles for biodiversity conservation in tropical production forests

The revised Guidelines follow a different format from the previous version, emphasizing the need for an integrated approach. They recognize that it is not enough just to improve management in the forest. A whole set of concepts, laws, knowledge and public and political support for biodiversity in managed forests needs to be put into place. Simply persuading people of just how important production forests are for biodiversity is a major challenge. The Guidelines therefore deliberately target all of the people whose actions will impact forest biodiversity. They are grouped under the following principles:

Principle 1: Sovereignty and societal choice

Rights and responsibilities for biodiversity lie primarily with the states and societies within whose territories the biodiversity is located. Therefore biodiversity use and conservation are a matter of societal choice and should reflect national and local goals.

Principle 2: International commitments

Many countries have entered into legal and non-legally binding intergovernmental commitments to conserve biodiversity and these have impacts on arrangements for managing production forest landscapes within their territories. The presence of populations, species and assemblages of species that are subject to global or international conservation agreements within or adjacent to tropical production forests should be subject to surveys and special management measures.

Principle 3: Political commitment, policies and laws

Strong commitment from decision makers and adequate national policies, laws and regulations are needed to ensure that biodiversity interests are adequately addressed in forest management at all scales from the management unit to the landscape and national levels.

Principle 4: Land use and spatial planning

Achieving biodiversity objectives in production forests requires that land allocation to different sectors and spatial planning within and outside the forest sector take account of biodiversity objectives. This requires collaboration between sectoral institutions at the larger scale and negotiation amongst local land users at the landscape scale.

Principle 5: Decentralization, forest tenure and natural resource access rights

Achieving biodiversity conservation goals in production forests may be favored by decentralized management, improved institutional arrangements and governance both at the level of large scale land allocation and at the level of local peoples' resource access and land tenure rights.

Principle 6: Incentives

Society at large benefits from biodiversity conservation measures whereas the costs of conservation fall mainly on local forest managers. Incentives will often be required to make it attractive for forest managers to take special measures to favor biodiversity.

Principle 7: Knowledge, learning, technology transfer and capacity building

Learning, experimentation, dissemination of information and transfer of technology should be expanded to support biodiversity conservation in tropical production forests.

Principle 8: Managing production forests at a landscape scale

Production forests and other components of landscapes have complementary but differing roles in contributing to biodiversity conservation objectives.

Principle 9: Biodiversity considerations in planning at the management unit level

The forest management planning process, in which economic, social and environmental objectives and priorities should be balanced, is an essential means for ensuring that biodiversity conservations goals are clearly established.

Principle 10: Biodiversity conservation in planted forests

Planted forests should be managed in ways that benefit biodiversity, both within the planted forest area and in areas of natural forest that are retained within the planted forest matrix.

Principle 11: Maintaining functioning forest ecosystems

A fundamental goal of sustainable tropical forest management is to maintain ecosystem functions at both the stand and landscape scales. Biodiversity plays an important role in ecosystem functions and its conservation contributes to sustaining yields of timber and other products.

Message to biodiversity partners

The key message from the revised Guidelines is that forest harvesting should no longer be seen as a major problem for biodiversity. Instead, it should be seen as a major part of the solution. Tropical production forests are home to vast numbers of species whose conservation cannot be assured in protected areas alone. Sustainable forest management can make a major contribution to achieving the goals of the CBD and to maintaining the biodiversity values that are of such great importance to the people who live in and around the forests. The Guidelines demonstrate that in many situations a dollar spent on better management of a production forest will achieve more for biodiversity conservation than a dollar spent on another protected area.

Moving forward, ITTO and IUCN have to ensure that in the future biodiversity is seen as an important benefit of forest management. The foresters of the future will not just be producing timber, they will also be the stewards of much of the world's forest biodiversity. Together ITTO and IUCN will roll out these Guidelines in the forests of member countries and continue to learn and promote better forest management practices throughout the tropics.

Acknowledgements

The core team that worked on the revision process over the past three years consisted of Emmanuel Ze Meka and (in 2008) Eduardo Mansur from ITTO; Jeff Sayer, Stewart Maginnis and Intu Boedhihartono of IUCN; Petrus Gunarso of CIFOR and TROPENBOS; Zacharie N'Zooh and Chairul Saleh of WWF; David Singh and Dana Gobin of IWOKRAMA; and Claudia Azevedo Ramos and Ana Euler of Brazil. John Parrotta of the USFS, Romain Pirard of CIRAD and Douglas Sheil of CIFOR all made major contributions.

The revised Guidelines will be available online (www.itto.or.jp) or from the ITTO Secretariat (address on p.2) following approval by the ITTC in November 2008.

RIL for biodiversity and carbon conservation

Deramakot forest shows positive conservation impacts of reduced impact logging

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Reduced impact: Wild elephants roam around Deramakot. *Photo: H. Matsubayashi*

FOREST CERTIFICATION assures green consumers that the wood products that they wish to purchase are produced from a well-managed forest (Leslie *et al.* 2002). Forest certification also gives producers an eco-friendly label so that they obtain better market access and (in some cases) greater income to compensate for the higher cost of management incurred during the certification process (often including the application of reduced-impact logging—RIL). By linking green consumers and certified timber producers, forest certification is expected to ultimately drive unsustainably produced timber from the markets. Forest certification is expected to give economic incentives to timber producers and economic/ecological value for green consumers.

… biodiversity indicators are at a rudimentary stage in terms of testing on the ground and have not yet been proven for wide applicability. Moreover, the additive effects of reduced-impact logging (RIL) have not been tested systematically …

Green consumers who are willing to pay a premium for certified timber are actually valuing the reduced level of environmental impacts on forest lands, including habitats for wildlife and biodiversity, during harvesting. Green consumers assume that the forest certification scheme correctly evaluates the additive positive effects of the management practices in the forest from which the wood products originate. However, the additive positive effects that need to be labeled by forest certification are not always scientifically well evaluated. This is especially so in the case of biodiversity. Biodiversity is among ITTO's criteria for sustainable forestry and is included in almost all auditing schemes for forest certification. However, such biodiversity indicators are at a rudimentary stage in terms of testing on the ground and have not yet been proven for wide applicability. Moreover, the additive effects of reduced-impact logging (RIL) have not been tested systematically for many taxonomic groups. This paper briefly reports the results of a recent Malaysia-Japan collaborative project in Deramakot forest (a model site for RIL) in Sabah, Malaysia, which concludes that reduced-impact logging is effective in maintaining a level of biodiversity equivalent to a pristine rain forest, and in stocking a greater amount of carbon than that of nearby conventionally logged rain forest.

Deramakot forest

The Sabah Forestry Department, with technical support from the German Aid Agency for Technical Cooperation, began developing a management system in Deramakot Forest (which consists mostly of a lowland tropical rain forest of mixed dipterocarp trees) in 1989. The intent was to ultimately manage all commercial forest reserves in Sabah in a way that mimics natural processes for sustainable production of low volume, high quality, high priced timber products. A Forest Management Plan (FMP) was developed and about 55 149 ha of the entire Deramakot area was set aside for log production with 4 000 ha of protected area established for conservation. This FMP is the blueprint for operational work and biodiversity conservation in Deramakot up to today. Deramakot is divided into 135 compartments of varying sizes and the annual harvest is planned on a compartment basis. The annual allowable cut

is not more than 20 000 m³. A strict protection area is set aside for biodiversity conservation within the reserve. RIL has been employed for harvesting with minimal impacts on the physical environment. Deramakot Forest Reserve was certified as 'well managed' by the Forest Stewardship Council (FSC) in 1997 and was the first natural forest reserve in Southeast Asia so recognized as being managed in accordance with sustainable forestry principles.

In March 2003, a collaborative research project was initiated between the Sabah Government and several Japanese universities to investigate the recovery processes of tropical rain forests after RIL. Additive effects of RIL were evaluated by comparing Deramakot with surrounding areas where conventional logging was continued until recently (see Lee *et al.* 2006). Fieldwork was conducted in the two sites where RIL took place three years and eight years prior to the time of the fieldwork.

The richness of species and families of canopy trees per small plot was significantly greater in the RIL forest than in the conventionally-logged forest. The richness of species and families in the RIL forest was not different from that in the nearby pristine forest.

Carbon stocking

The amount of carbon stocked in the above-ground vegetation was estimated based on a specially developed algorithm using satellite data. The mean amount of carbon in above-ground vegetation is estimated to be 156±18 ton/ha in Deramakot where RIL is being practiced, while it is 123±11 ton/ha in the conventionally-logged forest. The difference of 33 tons of carbon per ha is statistically significant and is considered as the mean, positive effect added by RIL. Extrapolating for the entire area, RIL brought a net addition of about 1.8 million tons of carbon for 55,149 ha.

Biodiversity

Researchers compared the additive effects of RIL for the community composition and richness of tree species, macro soil fauna, flying insects, and large mammals by comparing Deramakot with the surrounding conventionally-logged forests.

Tree species: The richness of species and families of canopy trees per small plot was significantly greater in the RIL forest than in the conventionally-logged forest. The richness of species and families in the RIL forest was not different from that in the nearby pristine forest. Logging can increase the number of tree species by favoring fast-growing pioneer species and one might suspect that the greater richness in the RIL forests is due to the addition of the pioneer species that are favored by logging. However, the composition of the canopy tree community in the RIL forest was more similar to that of the nearby pristine forest. From this research, it can be concluded that RIL can maintain the richness and composition of the canopy tree community at a level equivalent to the pristine forest.

Macro soil fauna: Macro soil fauna consists of various organisms such as earthworms, termites, ants and insects found in the litter and surface soil horizons. The density and the richness of taxonomic groups at order or equivalent taxonomic level (not species in this case) were not different among the RIL, conventionally-logged, and pristine forests. However, the composition of the soil macro-fauna community was modified greatly by conventional logging, but less so by the RIL operation. Therefore, RIL could maintain the richness, density and composition of soil macro fauna reasonably well at least at broader taxonomic units. Macro soil fauna includes the important decomposers that function in nutrient cycling and sustain tree growth. They are relatively immobile compared with those living above the ground, and can be relatively easily sampled. It is thus suggested that the composition of soil macro fauna is a good indicator for assessing impacts on biodiversity.

Flying insects: Seven families that were trapped with baits, including fruit flies, bees, sap beetles and others, indicated a general pattern that the populations in the understorey were more sensitive to logging than in the canopy layer. The number of trapped insects decreased with increased logging intensity for some families. In this case, RIL did not maintain the population abundance of the flying insects at a level equivalent to the pristine forest, but maintained a higher abundance than conventional logging.

Medium to large sized mammals: A limited survey using camera traps indicated that the number of photographed mammal species was greater in the RIL forest than in the conventionally logged forest. A few mammal species demonstrated a higher frequency of appearance in the RIL forest than in pristine forest. Large mammals are often hunted for bush meat unless the access of hunters is physically limited. The greater species variety and population abundance in the RIL forest may just reflect the protection from hunting, because the access to the RIL forest is limited by locked gates. However, another independent census on the orangutan population from a helicopter also indicated a significantly higher nest density in the RIL forest than in the surrounding forests.

Conclusions

These results are still incomplete because other important organisms such as amphibians, reptiles and birds are not included. However, this study shows that there are direct benefits from improved forest management in Deramakot on biodiversity. RIL is certainly effective for sequestering a greater amount of carbon in the above-ground vegetation. The degree of the benefits appears to vary depending on taxonomic groups, but canopy tree species generally maintain a level of richness and composition comparable to the nearby pristine forest. Soil fauna is also likely effectively protected by the improved management. Highly mobile

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Mapping Mbalmayo Forest

Remote sensing helps with the management of Cameroonian forest reserve

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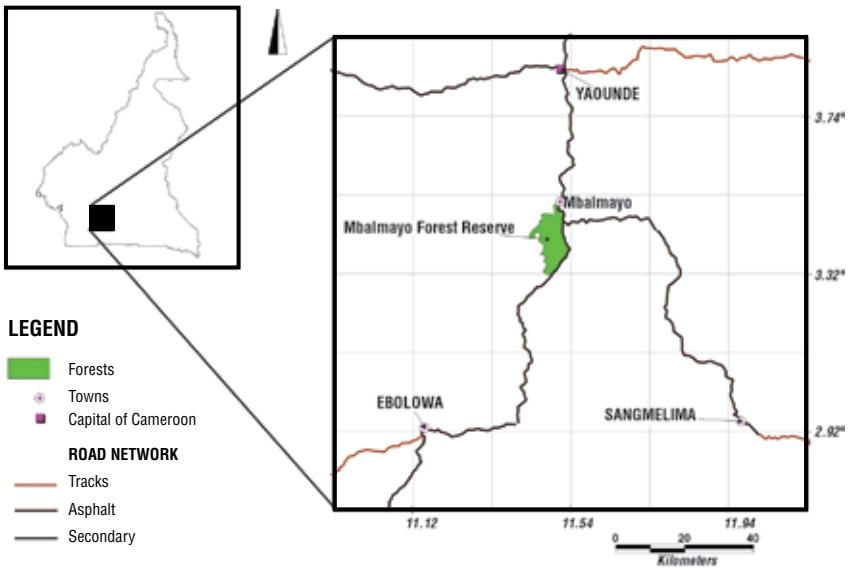
ESTABLISHED IN 1947 by the French colonial administration, the Mbalmayo Forest Reserve (MFR) ranks among the oldest protected areas of Cameroon. The majority of Cameroon's forests, including the reserves, are now threatened by degradation and advancing fragmentation due to the steady increase in local populations (Whitemore 1997, Lawrence and Bierregaard 1997, Simberloff 1986).

Previous studies undertaken in the MFR (Yonta, 1994; Owona, 2006; Temgoua, 2007) show that this area is utilized and inhabited by local communities. The activities of such populations, combined with other natural causes lead to changes in vegetation, biodiversity and landscape, to an extent which is not well recognized.

The resulting landscape units are made up of a mosaic of agricultural plots associated with disconnected wooded areas of varied size and shape (Galochet *et al.*, 2002). A land use study was undertaken in the MFR in order to produce a spatialized database. Starting from three high resolution Landsat satellite images and field validation surveys, this study mapped the current land use status in the MFR. The thematic mapping of landscape units thus produced could be used as a reference in future analyses of the Reserve's dynamics.

Where

Figure 1: Location of Mbalmayo Reserve



The study aims at contributing to the generation of information for decision-makers in charge of the environmental policy and management of this protected area, including for local communities since forest policy in Cameroon is increasingly focused on transfer of forest management responsibilities to communities.

Mbalmayo Forest Reserve

The MFR is located about fifty kilometres from Yaoundé, the administrative capital of Cameroon, in the department of Nyong and So'O of the central province. It is bounded to the East by the asphalted Yaoundé-Ebolowa road , to the North and the West by the Nyong river and to the South by the So'O river *(Figure 1)*.

... continued from page 8

organisms such as flying insects and mammals need further research; however, these also appear to be protected to some extent. Strict compliance with the international principles, criteria and indicators of SFM maintains the abundance of keystone fruit species, standing dead snags, large stems, foliage and litter on which animals depend for food and habitat, and appears to maintain plant and animal diversity relatively intact. Lowered harvest volume and minimal impacts from skid trails help to keep the microclimate nearly intact. However, this does not mean that all certified tropical forests maintain biodiversity equally well because principles, standards and auditing systems can vary depending on the certifying body and location.

The island of Borneo where Deramakot is located has lost a vast area of tropical rain forests in recent years due to forest fire and land conversion. The area of strictly protected natural parks comprises only several percent of the total land area. Production forests function as the habitat for biodiversity in the current degraded landscape of Borneo, especially for large wildlife which has wide home ranges. Well-managed production forests, as described here, are expected to play a major role in the conservation of values like biodiversity and carbon stocking. The adoption rate of RIL and forest certification is, however, marginal because most producers cannot secure adequate revenue. Unless additional financial values are attributed to well-managed forests and the revenue available to forest managers thereby supplemented, the present situation of marginal adoption rate will not improve. It seems clear that the timber-related revenue from well-managed forests needs to be supplemented by the payment for other ecosystem services of global importance. Biodiversity and carbon storage are two ecosystem services of global importance that a tropical rain forest can provide, and adequate financial remuneration based on the additionality of conserving biodiversity and carbon storage potential in improved forest management will give producers a better economic incentive to undertake it.

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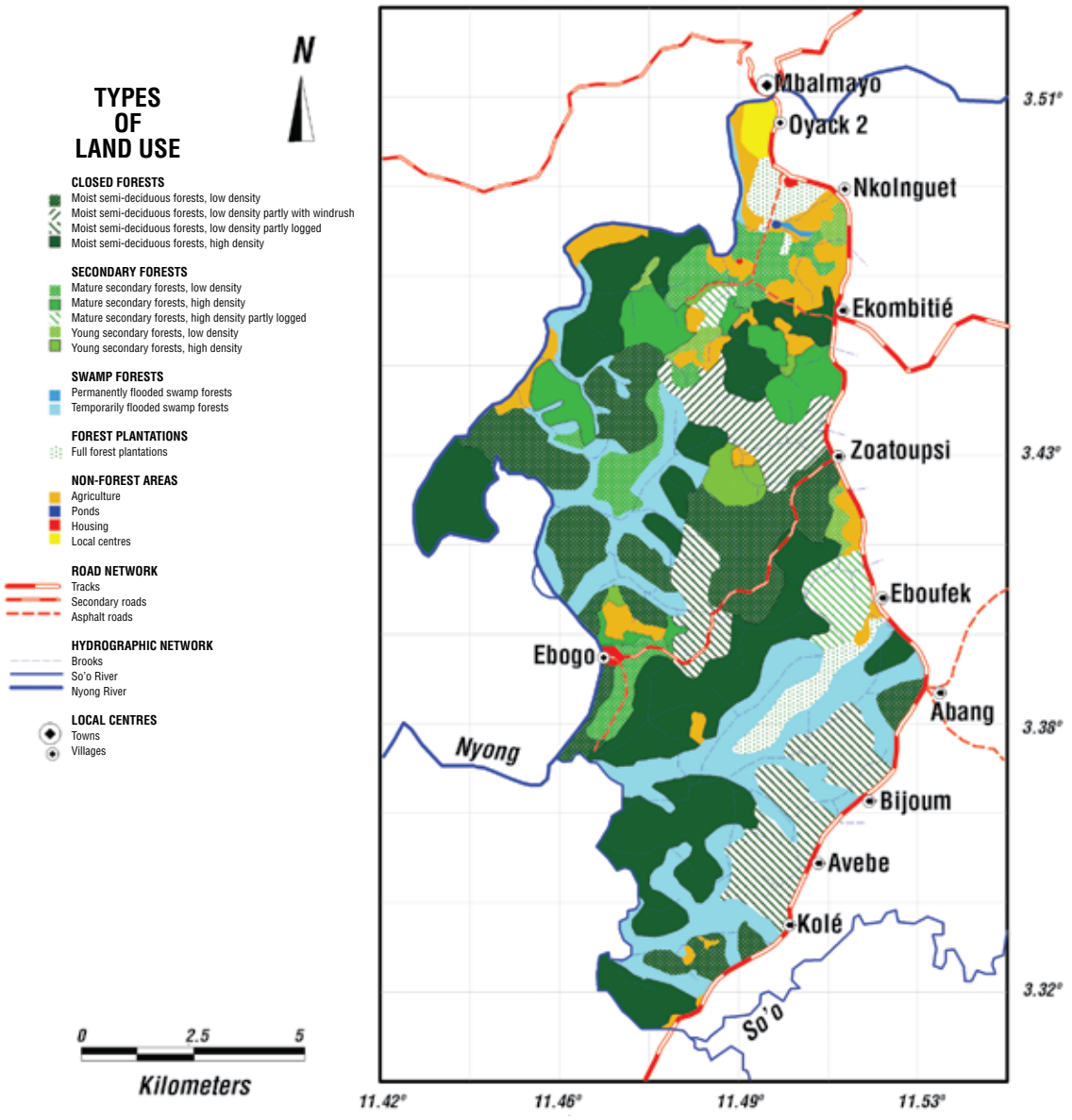
Mosaic of uses

Figure 2: Land-use map for the MFR



The MFR covers an area of 9700 hectares, with its center situated at 3.24 degrees latitude north, and 11.30 degrees east longitude. It is characterized by a Guinean bimodal climate with an average annual rainfall of 1600 mm. The average annual temperature is about 23°C and the average relative humidity is 78%. It is situated at an altitude of 640 metres, on soil with yellow desaturated ferralitic sesquioxides on a bedrock of schist. The natural vegetation of this zone is a transition between semi-deciduous forest and closed evergreen forest.

Remote sensing and mapping

The data used within the framework of this study are high resolution satellite data. The images were captured with the ETM+ sensor of the Landsat satellite, obtained from images taken on 21st October 2001 with a 28.5 meter resolution. The images were obtained from the archives of Yaoundé University, whose geography laboratory was used for image processing. It was not possible to obtain more recent images free of charge.

The first stage of processing consisted of roughly differentiating objects in the images according to their spectral signature. An analysis of the main components and convolution filters (High pass and Gamma) were used in order to improve the image contrast. These operations, coupled with the use of a 1991 ONADEF stratification handbook for southern Cameroon and a topographic chart of the MFR, enabled the identification of four main layers, i.e.: swamp forests, closed forests, secondary forests and bare soil. A preliminary classification and land use chart was prepared using the maximum probability method; this allowed points of control for field monitoring to be identified.

The digitization of the objects appearing on the processed images was carried out using the MapInfo 7.5 GIS software. Sets of pixels distinctive in terms of contrast, color and texture were digitized under three specific headings: hydrographic network, vegetation and roads.

Field missions consisted mainly of surveying the site under study. Two types of surveys were carried out: (1) surveys to validate and refine the land use types, and (2) surveys among local stakeholders.

The transect method (Galochet *et al*, 2002) was used for the validation surveys, with the transects established systematically every kilometer along the main access road. In total, 21 transects were surveyed. Using a GPS receiver, the changes in vegetation along the transect (type and physical appearance) were recorded as geographical co-ordinates. The data thus obtained enabled a comparison of the typology derived from the image processing with the actual findings on the ground, and to define new land use and/or vegetation classes by refining the preliminary chart.

Mostly forest

Table 1: Breakdown of land use in the MFR

TYPES OF LAND USE OBSERVED	SURFACE AREA PER TYPE *(hectares)*	FOREST SURFACE AREA *(total %)*	MFR SURFACE AREA *(%)*
Moist semi-deciduous high density forest	2 837	28	25
Moist semi-deciduous low density forest	1 825	18	16
Moist semi-deciduous low density forest, partly with windbrush	439	4	4
Moist semi-deciduous low density forest, partly logged	995	10	9
Mature high density secondary forest	623	6	5
Mature high density secondary forest, partly logged	286	3	3
Mature low density secondary forest	657	7	6
Young high density secondary forest	172		2
Young low density secondary forest	141	1	1
Permanently flooded swamp forest	9	0	0
Temporarily flooded swamp forest	2 110	21	19
SUB-TOTAL OF NATURAL FORESTS	**10 094**	**100**	**89**
Full forest plantations	343		3
SUB-TOTAL OF FULL FOREST PLANTATIONS	**343**		**3**
Agriculture	788		7
Local centres	89		1
Housing	26		0
Ponds	3		0
SUB-TOTAL OF NON-FOREST AREAS	**906**		**8**
TOTAL	**11 343**		**100**

Land uses and vegetation classes in MFR

Through the field missions and using the ONADEF handbook on the stratification of the territory, 7 classes of land use and 11 subclasses were identified *(Table 1)*, resulting in the chart of land uses in the MFR shown in *Figure 2*. This chart was developed by superimposing the following layers of information which were digitized using MapInfo: vegetation, roads, land utilization, hydrographic networks and topography.

The units of vegetation identified/located by photo-interpretation were verified during the field surveys and adjustments were made to take into account the slight modifications of land uses which had occurred between the dates of the satellite images and of the field missions. However, ambiguities exist in the classification of some layers, including moist evergreen versus moist semi-deciduous forests; closed versus mature secondary forests; forest line plantations versus secondary forests; and temporarily flooded swamp forests versus permanently flooded swamp forests.

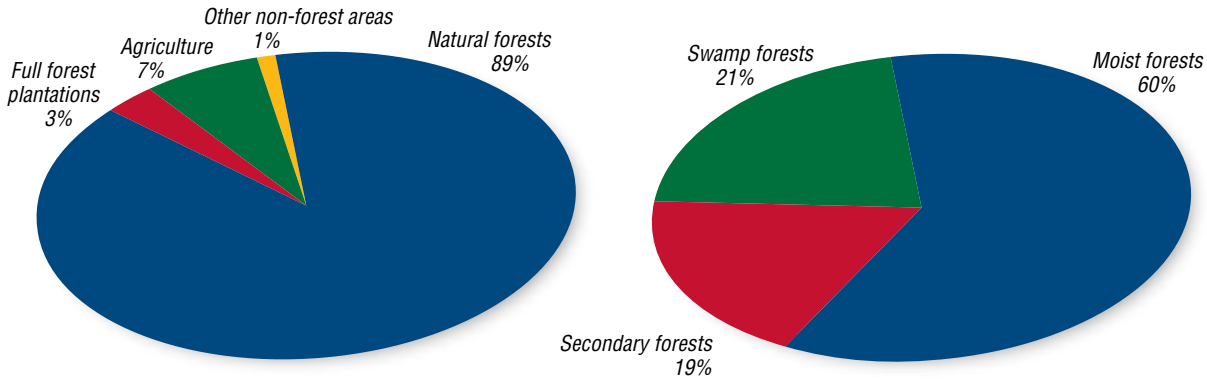
The confusion between moist evergreen forests and moist semi-deciduous forests results from two factors: (1) the reserve is situated in a zone of transition and the forest therefore comprises a mix of the species characteristic of these two types of formations; and (2) the study was carried out during the rainy season when the foliage of almost all the trees is dense. Not having taken an inventory in the various layers, it was difficult to estimate the proportion of the species which are characteristic of these formations within each layer. As regards the ambiguity between closed forest and mature secondary forest, it was easily resolved on the ground by observing the undergrowth and identifying the heliophile species. Confusion between forest line plantations and secondary forests is due to the forestry techniques used to enrich the forest. At the end of the 1940s, the French colonial administration undertook enrichment in the area by applying several forestry practices, among which were regeneration and line planting. The plantations resulting from these two techniques are perfectly integrated within the secondary forests. Therefore, all these formations were included in the category of secondary forests. However, obvious forest plantations, such as the arboretum, were classified separately.

… the limits between mature secondary forests and adjacent moist forests remain difficult to distinguish insofar as there are no obvious distinctions between these two types of forests, as is also the case for the limits between permanently flooded swamp forests and temporarily flooded swamp forests.

The surface areas of the various vegetation and land-use classes charted were estimated using the GIS software (Table 1 and *Figure 3*). The MFR, including the Ebogo and Bilik enclaves, comprises 10 094 hectares, with forest formations covering approximately 89% of its area. Moist semi-deciduous forests make up the largest forest type,

Land and forest

Figure 3: Breakdown of MFR surface area by land use *(left)* and natural forest type *(right)*



accounting for almost 60% of the cover; the swamp forest group is the second largest at approximately 20%; secondary forests account for approximately 18%, and forest plantations 3% of the forest cover. Cultivation is carried out over approximately 7% of the reserve area.

Conclusions

Remote sensing has a very significant potential for practical applications in tropical environments (Gong and Brognoli, 2005). Satellite high spatial resolution data offer substantial possibilities for mapping the features of tropical vegetation (De Wispelaere, 1993). However, the limits between mature secondary forests and adjacent moist forests remain difficult to distinguish insofar as there are no obvious distinctions between these two types of forests, as is also the case for the limits between permanently flooded swamp forests and temporarily flooded swamp forests. The impact of agriculture on the landscape also appears small (approximately 7% of the MFR's surface area) although some cultivated land may be included in areas categorized as secondary forests. These ambiguities, together with inaccuracies inherent to the mapping process, considerably influence the accuracy with which the size of each type of land use is determined and mapped. However, the field surveys show that agriculture is the main impact on the dynamics of the reserve's landscapes. Nevertheless, it will also be necessary to take into account the impact of forestry techniques, illegal logging and abiotic disturbances (e.g. wind-throw) in future studies of the MFR.

This study resulted in an inventory of the current status of land uses in the Mbalmayo Forest Reserve. Satellite photo-interpretation and the use of GIS software, coupled with field surveys, made it possible to identify and describe the landscape units in this tropical environment. However, the results achieved in this study contain some ambiguities in terms of categorizing forest types and land uses which need to be resolved by the implementation of more complete floristic inventories and land-use surveys.

Acknowledgements

The authors wish to thank Robert Nasi, Nicolas Fauvet, Jean-Claude Bruneau, Ibrahim Lindjiouom, Appolinaire Nankam and Rahoul Mbida for their contributions to the implementation of this work.

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Management and conservation of forest concession biodiversity

Evaluation of ITTO projects shows positive outcomes in North Congo

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THE CONGO BASIN is the second largest continuous mass of tropical moist forests in the world after the Amazon and is abundant in varied and unique flora and fauna. For centuries the basin's local populations have lived from gathering, fishing and hunting in these forests. In recent years, many of the Congo basin's forests have been earmarked for development. Current forest development activities (including establishment of road infrastructure, industrial facilities, housing and transport logistics) are drawing an influx of workers and other migrants totaling in the tens of thousands of people. These various communities live within and around the forest, generally with easy access to forest resources facilitated by forest roads.

With the widespread circulation of small light arms, Congo basin fauna has been increasingly subject to poaching to supply local and urban markets, and for the export of trophies. Consequently, the populations of animal species protected by law, such as gorillas, elephants or bongos, have declined, often sharply. Even small mammals, a vital traditional source of protein for native populations, are in some places threatened with extinction.

Traditional systems of natural resource management, as well as holy sites and local ways of life are often being disrupted by forest development, and native communities often feel marginalized especially where forest industries employ outsiders. In many places, forests are being managed without taking into account ecological, socio-economic, cultural and religious parameters.

Green business: Villagers selling gnetum leaves, Pokola Market.
Photo: M. Borner

Congo projects

In the Republic of Congo, forests occupy approximately 60% of the country's surface area (20.4 million hectares). Recognizing the ecological and economic importance of these resources, limited areas of high ecological value have been totally protected. However, 15 million hectares of Congo's forests are intended for production and are subject to forest management. Congo, as a member of ITTO and signatory of relevant international conventions, is aiming at achieving the sustainable management of its forest resources. With this perspective of sustainability in mind, the ITTO-funded project entitled 'Biodiversity management and conservation in a forest concession adjacent to a totally protected area of the Nouabale-Ndoki National Park (PROGEPP)' was initiated in 1999 in North Congo in order to implement the techniques of sustainable management. The implementation of a system of fauna and forest management is at the center of the PROGEPP activities, with the participation of local communities. PROGEPP was conceived to safeguard forest resources for their long-term use by the local communities and the indigenous populations.

PROGEPP is a joint initiative between Congo's Ministry for Forestry Economics (MFE), an international NGO (Wildlife Conservation Society, WCS), and a private company (Congolaise Industrielle des Bois, CIB). The project site covers an area of approximately 1.8 million hectares (including the national park and the CIB concession) in one of the most critical regions for biodiversity in Africa.

The project aimed to reduce the human pressure on fauna and biodiversity through enhanced protection of these resources and the introduction of reduced impact logging. In September 2001, a second agreement was signed with the ITTO for project PD 4/00 Rev.1(F), which placed particular emphasis on the participation of local communities in the planning and management of natural resources. This partnership with the ITTO was recently renewed in 2007 under project PD 310/ 04 Rev.2(F).

Strategic partners

The MFE provides institutional, human, logistic and financial support for the smooth operation of the project. The results achieved, as well as the management tools developed, are integrated into the management plan adopted by the Government and will enable it to replicate results in other forest management units (FMUs). They will also help the Government to adapt its legal and institutional framework at the national level, with potential implications in Central Africa, where Congo is a member of the Sub-regional Commission on Forests.

CIB, which has been operating in Congo since 1969, has been allocated forest concessions of approximately 1.3 million

hectares constituting the buffer zones of the Nouabalé-Ndoki National Park (PNNN). CIB has significant industrial facilities in two sites (Kabo and Pokola). In its vision of long-term sustainable production, CIB provides substantial financial support to the PROGEPP, especially for protection. Moreover, CIB also has a management unit which plans for reduced impact logging (RIL), and a social unit which designs, together with local communities, a participative planning process as a basis for consultation. CIB has introduced into its rules of procedure provisions to formally ban hunting in prohibited sites and the transport and export of bush-meat from one site to another. An environmental management plan has been established within its industrial sites. The management plan of the Kabo concession, the first in the Congo, was adopted in 2006 and has obtained FSC certification, and CIB is continuing the same process in its other concessions. The objective is to position itself in external timber product markets which are becoming increasingly demanding for timber sourced from sustainably managed forests.

WCS is an American NGO which operates at the international level for nature conservation. Through an agreement with the Congolese Government, it was engaged to ensure the management of the PNNN and take charge of procurement activities for the PROGEPP. Given the disregard which forest companies have sometimes shown for conservation concerns, and the rather common spirit of opposition of environmental NGOs towards timber industries, both WCS and CIB should be congratulated for their strong involvement and constructive concerted approach to the management of a multi-use forest. WCS has set up a monitoring system (focusing on ecological and socio-economic monitoring, research, and law enforcement) which is a set of performance indicators to measure the project's progress. It is also committed to raising the awareness of local communities, both children and adults, regarding laws and regulations governing hunting, and the rational use of natural resources.

The local populations consist of native villagers, various groups of nomads (Pygmies), and workers of the CIB and their dependents. They have formed committees to manage their hunting grounds and, after some training, have largely assumed the management of their natural resources, including contributing to the removal of illegal hunting camps.

The partnership between these stakeholders, built on a long-term vision, is a unique and revolutionary initiative in Central Africa because it unites stakeholders with divergent objectives around a common theme of sustainably managing forest resources.

Project results

With the active participation of native communities, a zoning plan for hunting was established by the PROGEPP, taking into account the various land uses by communities/ethnic groups. Natural resources essential for the semi-nomads have also been defined to protect them from over-exploitation (e.g. individual sapelli trees, important for the collection of caterpillars or honey). The zoning plan was innovative since it extended 'outside the protected area' and reconciles the conservation objectives with the rights and activities of the local populations on the one hand, and the legislation relating to hunting on the other, while taking account of the economic interests of the forest industries.

Forest wardens are recruited within the local communities and trained by WCS to create monitoring and anti-poaching teams. The forest wardens constitute the backbone of the protection framework. Permanent road stations have been established to check vehicles, and mobile teams patrol in the forest to search for poachers and illegal traps.

The project also trains Congolese researchers in ecological and socio-economic monitoring in its Ecological Research Center. The data collected help to adapt project strategies and to monitor local needs, as well as providing scientific support for the reduced impact logging activities. The results of this research indicate that the populations of protected fauna species have benefited from the project. Traveling through the forest, one can meet gorillas crossing the roads, and see buffaloes or bongos in the clearings. The increasing presence of elephants close to villages and in fields is an indicator of the success of protection, but constitutes an on-going problem of conflict between man and wildlife. The project has already experimented with several elephant deterrent methods, but this remains a recurring problem which requires the attention of all conservation stakeholders.

The project has achieved its main objective, i.e. the protection and conservation of forest resources. Participatory community management still requires much effort (including continued training) and must be embedded in a long-term vision to achieve effective joint administration and empowerment of the communities to manage their lands.

Demographic and social issues

In Pokola, CIB's main base, the establishment of a significant forest industry has created a unique socio-economic situation in the north of Congo. A large town has been built in the middle of a sparsely populated forest area, 10% of the 13 000 inhabitants of which are employed by CIB. This situation has required that CIB take responsibility for assuming State functions (e.g. health, schools, water and energy). A quality of life not easily found elsewhere attracts immigration to Pokola, carrying the risk of non-sustainability and depopulation of other regional townships. The supply of food poses a problem, with the import of protein sources (e.g. beef, chicken, fish) required to reduce the human pressure on wild fauna.

Income producing activities other than hunting have been introduced and should be further developed to fit adequately within the project strategy under its on-going phase. It is essential that the Government develop more regional urban centers and encourage migration to towns rather than to the forest. The Government should also continue to support the transfer of responsibility for forest management and the decision decentralization process to the indigenous communities.

It is also essential for the project to develop activities dependent on the conservation of natural resources, thus reinforcing the interests of local communities in the sustainable use of such resources. For example, this could take the form of growing and gathering gnetum leaves (*Gnetum africanum*), honey and basket-making material. All these activities will take time to produce significant results, because the local communities still need to be strengthened at the organizational, design and training levels.

One of the greatest constraints facing the project lies in the lack of human resources, either at community level for organizing themselves and to function as productive groups, or at the level of technicians, and especially at the management level to build on the initiatives undertaken. A plan for the development and management of human resources must be established by the project to ensure the long-term achievement of the objectives of sustainable forest resource management.

Continued on page 15

Sustainable bamboo utilization in Thailand

Long term improvements result from an ITTO project

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Hand up: Villagers pass bamboo seedlings for planting at Ban Mae Mae Community Forest.
Photo: F. Soriano

FOREST-dependent communities in Thailand became increasingly dependent on the harvesting and trading of non-wood forest products (NWFPs) such as bamboo and rattan, gums and resins, edible plants including mushrooms, medicinal plants and spices, edible insects, tannins and other crops, as a result of the total ban on logging in the country that started in 1989. ITTO pre-project PPD 4/98 Rev.1 (I) 'Promotion of Tropical Non-Wood Forest Products in Thailand' identified the problem of rapidly declining bamboo resources due to excessive harvesting, including illegal harvesting of bamboo stands in the forests. Appropriate propagation and plantation management techniques for shoot and pole production were generally not widely known by farmers. Similarly, rural-based bamboo-using enterprises had limited access to information and technologies on the efficient use of bamboo; hence no opportunities to improve traditional products, let alone produce higher value ones.

ITTO PD 56/99 Rev.1 (I) 'Promotion of the Utilization of Bamboo from Sustainable Sources in Thailand' arose from PPD 4/98 and was implemented by the Royal Forest Department (RFD) of Thailand from October 2000 to September 2004 to promote sustainable bamboo plantation management and utilization as a means of generating livelihoods and income for rural communities engaged in collecting, processing, storage and sale of bamboo products. Plantation management techniques were disseminated to farmers and other villagers by establishing experimental plots planted with five selected commercially important bamboo species either for shoot or pole production in two

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Sustainability and wider applicability of project outcomes

Since its initiation in 1999, this project has carried out many activities which today constitute assets and bases for the continuation of the principal objective of biodiversity conservation while taking into account the needs of local communities. The tools for biodiversity conservation and a methodology for reduced impact logging have been developed. This project is therefore a well-suited model for replication in other FMUs. However, replication entails some preconditions.

A consistent political and institutional will to promote and advance the sustainable management of forest resources is essential. While the national forest policy aims towards sustainable reduced impact logging, this policy does not seem to be consistently and effectively imposed on all operators in Congo. Industrial companies which make substantial efforts in forest management and biodiversity conservation are often penalized rather than remunerated for their efforts. They invest at the social and environmental levels, and assume the responsibility for functions of the State, but are taxed at the same rate as operators who undertake no such investments/responsibilities. To promote an equitable policy of good management in all FMUs, the Government must apply a 'motivation—sanction' approach to encourage operators, e.g. by granting tax advantages and, at the same time, exerting pressure on those companies which do not fulfill their obligations, e.g. by withdrawing their concessions.

In addition to the ITTO funding, the project partners have committed themselves to financially supporting the project in its current phase. However, the experience of the last several years has highlighted a lack of adequate financing. While seeking the contribution of other donors, innovative and sustainable finance sources, for example the use of part of the taxes paid by the forest industries, should be explored.

In the long term there must be a synergy between conservation on the one hand and the well-being of the local populations on the other. More intensive support for economic development with regard to the sustainable use of natural resources by the local populations is necessary, at the same time as intensified efforts to raise public awareness and education. Indeed, these two aspects must be combined to show how sustainable natural resource management leads to activities which produce income and preserve the resources at the same time.

The full evaluation report and more details on the Congo projects are available from rfm@itto.or.jp.

demonstration sites. One site was at the Ban Mae Mae Community Forest in Chiang Mai Province and the other at the RFD Forest Products Research Center (FPRC) in Nakhon Ratchasima Province. The project implemented research and development studies with the view to establishing community-based enterprises on the processing and packaging of bamboo shoots, utilization of bamboo for furniture/furniture parts and charcoal production. The project also disseminated techniques and information gathered from international training workshop and conference such as the INBAR-organized 'International Training Workshop on Bamboo Handicraft Techniques and Its Tools and Small Machines' held in October 2001 in Zhejiang and Sichuan, China; the short–term training course on the utilization of bamboo charcoal in November 2001 at Kyoto University and the World Bamboo Conference in India in March 2004.

Ex-post evaluation of the project was carried out in February 2007, 29 months after the project's completion. The primary purposes of this evaluation were to provide a concise diagnosis to pinpoint the successful and unsuccessful outcomes, the reasons for the successes and failures, the project's contribution towards the achievement of ITTO's Objective 2000, and to draw lessons that could be used to improve future similar projects. This evaluation was done simultaneously with the evaluation of a related project, PD 24/2000 Rev.1 (I) titled 'Promotion of Sustainable Utilization of Rattan from Plantation in Thailand', also implemented by the RFD.

Project design, outputs and attainment of objectives

An examination of the research-to-impact pathway in the project design showed that within the time and resources available, the design focused more on outputs rather than socio-economic outcomes. The rationale of the vertical logic was appropriate; however, some outputs such as technologies on bamboo shoot processing and packaging, charcoal producing, and furniture making had only short-term effects. The link between the project outputs with the higher order objectives could be improved by integrating a sustainability plan addressing, among others, uncertainties brought about by external factors.

The project had accomplished several activities without additional cost to ITTO, namely: a) a bamboo products design contest was held for university students; b) a traditional bamboo demonstration house was built at the Ban Mae Mae Community Forest; and c) research and development studies on bamboo-cement boards and laminated bamboo flooring. These activities added value to the overall project outputs.

Impact and relevance of the project

Project activities promoting the trade of bamboo propagation materials, fresh edible shoots and poles were the most widely accepted and adopted by the rural communities in Nakon Ratchasima and Chiang Mai. Aside from the species introduced in this project, private plantation owners have also acquired plantation materials from other countries/regions such as China, Taiwan, Indonesia and East Timor, although usually through unregulated means (i.e. without phytosanitary or seed analysis certificates as safeguards against introducing bio-invasive species and related problems that threaten the local bamboo industry).

At the time of the evaluation, a limited annual supply of plantation materials from local commercially important bamboo species was being distributed for free by the FPRCs, but could also be bought from private plantations for Bt 50–200/seedling depending on the species' commercial importance. Locally propagated plantation materials from imported species were available from private plantations for Bt 200/seedling, but some for as much as Bt 3000/seedling.

The project activities at Ban Mae Mae drew attention and generated the local government's support for the community after the project's completion. In 2006, the community received funds for the construction of some 50 traditional bamboo houses resembling the model house put up during the project; these are currently rented out to tourists at Bt 500 for an overnight stay.

Overall post-project situation

The project achieved the intended outcomes at the project sites, albeit to a limited extent. It is noteworthy that promotion of sustainable bamboo production and utilization technologies has been integrated in the RFD's in-place program on NWFPs. After the project's completion in 2004, demonstration plots and equipment such as the charcoaling kiln designed and built by the project have been replicated using RFD funds and installed at the newly relocated FPRC in Chiang Mai. These facilities are utilized in regularly conducted training courses that have served as further catalysts for establishing more bamboo plantations in Chiang Mai and creating new livelihood opportunities such as the sale of planting materials from commercially important species such as those studied in this project. Using RFD funds, a model house showcasing construction applications of bamboo was also put up at the Nakon Ratchasima FPRC campus.

Both FPRCs at Nakon Ratchasima and Chiang Mai continue to receive and respond to numerous requests for planting materials for high shoot-yielding species and those with quality poles. Good quality bamboo poles from managed plantations sell for Bt 75–240/piece compared to Bt 20–25/piece from unmanaged plantations. For bamboo shoots grown using appropriate plantation techniques, farmers claim an overall increase in income of over 100% or so owing to increased harvest of up to 50 kg/rai (about 300 kg/ha) in one day. Dry shoots sell for Bt 5–10/kg and steamed shoots for Bt 14/kg, but this can rise to Bt 35/kg during the dry season. On average, a farmer earns Bt 16 000/rai per month from shoots and as high as Bt 30 000 depending on the species and quality.

Traditional bamboo furniture is generally not appealing even to local buyers as it is perceived as poor man's furniture. However, through the application of more advanced techniques and processing technologies and innovative designs, small- and medium-size enterprises produce export quality middle to high-end bamboo furniture for France, Germany and the Middle East. Furniture makers who participated in project activities on plantation management and furniture design have upgraded their capabilities by acquiring power tools and imported electric dryers to meet bulk orders from the Middle East. Local bamboo handicrafts and furniture makers are generally aware of the government's One Tambon-One Product (OTOP)[1] Program and strive to acquire OTOP product certificates as a means to improve marketability and sales in competitive export markets. However, the local bamboo furniture industry still has to take advantage of the availability of Thailand's Furniture Testing Center as a means of upgrading and adding value to their products, and expanding their markets.

[1] *In Thailand, the One Tambon-One Product (OTOP) Five-Star Certification is given to enterprises with excellent quality products (processing methods and packaging), which are 100% made of local indigenous materials.*

There is little motivation for rural communities to engage in bamboo charcoal production because of widespread confusion over a prohibition on charcoal production and trade. In Thailand, charcoal manufacturing concessions were cancelled in 2006. Most villagers are not aware, though, that such cancellation is meant to arrest the rapid destruction of mangrove forests (largely attributed to charcoal production). At present, it appears that the regulation makes no distinction between charcoal from mangrove forests and that from sustainable sources such as bamboo plantations. Hence, there is a need to review and clarify policies and regulations on the trade of materials and products from plantations. Further development of bamboo charcoal vinegar or light distillate into higher value products for medicinal, fungicidal and other industrial applications should also be looked into.

Unexpected effects and impacts

During this evaluation, a farmer-participant from Chiang Dao District, Chiang Mai province expressed his serious concern regarding the gregarious flowering of his *Dendrocalamus sericeus* plantations. Most bamboo species die after flowering. A widespread gregarious flowering of *Dendrocalamus asper* in natural forests and plantations all over Thailand more than 10 years ago led to significant losses for the bamboo farmers. This flowering phenomenon is by far the most challenging threat to the promotion of bamboo plantation management and sustainability in Thailand, and anywhere in the world. There is no definite prescription on how to handle such a phenomenon. INBAR maintains a web page specifically on this topic and provides information on the number of years it takes for some species to flower.

The factors that influence bamboo's demise after flowering have not been established. The pattern of flowering in bamboo varies with species and the physiology of flowering remains unclear. Clear cutting does not appear to halt stand mortality, although some clumps may be induced to develop new shoots before finally dying altogether. Some species have been observed to recover after flowering[2].

Recommendations

Project design and outcomes. In projects involving community-based enterprise development as a strategy for conservation and sustainability, the duration, scope and pilot sites should be carefully selected to ensure direct and more straightforward links between enterprise and conservation to exist. Multi-stakeholder participation is critical during project formulation; equally important is expertise on socio-economic aspects, business development and marketing.

Enterprise-oriented NWFP-based communities. Future projects on non-wood forest products should ensure that aside from technological support, entrepreneurship and business skills development are vital components in enabling subsistence-oriented communities (such as most forest communities) to progress into enterprise-oriented entities.

Follow-up actions. The RFD, through its FPRCs, should immediately pursue an information and education campaign and coordinate with the appropriate regulatory bodies to place safeguards on importing bamboo propagation materials.

Likewise, the RFD must promote awareness of mitigating measures to the apparent gregarious flowering of bamboo plantations. In the medium term, RFD could establish a bamboo gene bank, and update its bamboo identification manual and bamboo resource database as these tools enable both the government and industries to make more accurate decisions.

The RFD, in collaboration with other government programs and private industry partners, should embark on the further development and commercialization of value-added products from bamboo such as high-grade charcoal and its distillate, and the engineered bamboo products developed in this study (bamboo-cement boards and laminated bamboo flooring). Regulations should be reviewed to ensure that such products are not adversely affected by legislation intended to protect other resources (e.g. mangroves). In the short term, the RFD and its collaborators should pilot the production of vacuum-fried bamboo chips (to be marketed as a rich source of dietary fiber) as the project had illustrated the technical and financial viability of this product.

The RFD, in partnership with the Ministry of Industry, should look into how the local bamboo furniture industry can benefit from the services of the Furniture Testing Center as a means of upgrading furniture designs and workmanship, encouraging innovations and expanding its export market. In its techno-transfer activities, the RFD should target wider diffusion of information and technologies by partnering with industry associations such as the Thai Furniture Industry Club and the Thai Furniture Industries Association.

The RFD should develop the Ban Mae Mae Community Forest into an economically viable ecotourism zone owing to its rich wood and NWFP resources and biodiversity, its strategic location (considering that Chiang Mai has a vibrant tourism industry), and the presence of the community's management committee that spearheads the conservation and protection activities in consultation with RFD. The management plan for such a zone should integrate the lessons learned in this project.

Conclusion

ITTO should continue to promote and support research and development studies on NWFPs with a view to improving forest management, as well as increasing the capacity of forest-dependent communities to conserve and enhance forest values. This project has confirmed that bamboo is one of many sustainable non-wood resources that can generate income for a large forest-dependent rural population, and that Thailand needs to take further steps to realize its full potential.

The complete report of the ex-post evaluation is available from the ITTO Secretariat (fi@itto.or.jp).

[2] *Tewari, D.N. 1992.* A monograph of bamboo. *International Book Distributors, Dehra Dun, India. 498p.*

Collaborative forest management in a sustainable development unit

An ITTO project in the Philippines promotes a multi-stakeholder approach to SFM

by
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Closed forest: Part of the SUDECOR forest management unit in the SDU. *Photo: B.D. Agaloos, Jr.*

SUSTAINABLE forest management (SFM) is the Philippine government's main policy thrust for managing the country's forests. The community-based forest management (CBFM) approach which recognizes the key role of communities in pursuing sustainable forest management is the main strategy for SFM implementation. The watershed and ecosystem management (WEM) framework promotes the use of natural watershed boundaries as integrative units for planning and implementation of sustainable development programs and projects, and ensures that management and development activities will be undertaken with due consideration of the needs and concern of all stakeholders.

These government forest policies provided the basic rationale and enabling conditions for the recently completed three year ITTO-funded project *Integration of Forest Management Units (FMU) into Sustainable Development Units (SDU) through Collaborative Forest Management in Surigao del Sur, the Philippines*. ITTO project PD 167/02 Rev. 2(F) pioneered the planning and implementation of sustainable forest management in a forest-based 'mountain to coast' sustainable development unit. It built on the gains and lessons learned from PD 35/96 Rev. 2(F) *Conservation and Maintenance of Biological Diversity in Tropical Forests Managed Primarily for Timber Production, Surigao del Sur, Philippines* and at the same time showcased on the ground the integration of sustainable forest management within the larger sustainable development framework.

The project strategy adopted was to develop an integrative planning framework and mobilize the SDU's stakeholders in planning and implementation of sustainable forest management interventions.

A sustainable development unit or SDU is a biophysical, socio-economic management setting that aims to achieve the multiple benefits of participatory sustainable resource management for present and future generations. As a biophysical unit, it covers a set of watersheds/ecosystems from the mountains to the coast and the areas in between. As a management approach, it integrates the various component ecosystems and sectors as well as programs and practices with diverse goals and priorities so that potential benefits can be optimized.

This innovative project was implemented by SUSTEC in the delineated area of East Diwata SDU. The SDU is located on the northeastern coast of Mindanao encompassing the northern portion of Surigao del Sur, a coastal province of Caraga Region. The SDU covers a total area of 325 491 hectares of which roughly 75% is classified as permanent forest lands and about 60% is still covered with forests. It consists of 61 distinct watersheds each with outlet(s) draining to the coastal area.

Objectives and strategy

The project was developed to contribute to the improvement and acceleration of sustainable forest management in the Philippines within an integrated sustainable development framework, thus addressing the factors that limit progress of the Philippines towards attaining ITTO Objective 2000. It implemented and showcased sustainable forest management at the FMU level, highlighting how the tropical timber resource base can be improved and harnessed to contribute optimally and jointly with other sectors towards attainment of sustainable development at the SDU/local level.

The project strategy adopted was to develop an integrative planning framework and mobilize the SDU's stakeholders in planning and implementation of sustainable forest management interventions *(Figure 1)*. The project strategy had four key components: 1) information, education, communication and social mobilization; 2) SDU framework formulation and planning; 3) SFM demonstration; and 4) management decision support development. It revolved around the implementation of the long-term SFM plan initially developed for the SUDECOR concession, aligned within an integrative SDU framework.

Outputs

The project produced an SDU management and development framework acceptable to stakeholders and formulated and implemented an action plan for SFM in the SDU within the project duration of three years.

An association of all types of locally-based stakeholder organizations within the SDU was organized, including representatives of indigenous and local people's organizations, forest management units, local government units, national government agencies, non-government organizations, alliances, cooperatives, academic and professional organizations, business organizations, etc. The association of such diverse SDU stakeholders was incorporated under Philippine laws and named the East Diwata SDU Stakeholders Association, Inc. (EDSSA, Inc.).

A medium-term action plan for sustainable forest management in the SDU (MTAP-SFM: 2006–2015) was formulated, adopted by EDSSA, and supported by the local government. This participatory action plan provides for implementation of the stakeholder collaborative framework for SFM in the East Diwata SDU for the first 10 years of its operation starting in 2006. The MTAP-SFM was developed by taking into account the SDU and WEM frameworks; hence it includes projects in all ecosystems and sectors from the mountains to the lowlands and coastal zone. It also includes EDSSA's sustainable development policy of 2006. It incorporates actions and guidelines following the ITTO criteria and indicators framework to guide all stakeholders on appropriate implementation schemes to facilitate progress towards SFM.

In addition to the two main outputs a management decision support system (MDSS) was designed for the SDU using database and GIS components. The MDSS generates data on the extent and spatial distribution of forest resources, areas of protection and production forests, potential operable forests, potential plantation and agroforestry areas, etc. A monitoring and evaluation system was also developed to monitor the progress of SDU projects, actions/guidelines and activities towards SFM using the ITTO criteria and indicators for SFM which were revised to conform to the SDU context. The project also assisted in the identification, feasibility studies, and initial funding of priority livelihood projects to be implemented by participating stakeholders.

The outputs demonstrated that Forest Management Units (FMUs) can be integrated into the SDU through a mutually agreed multi-stakeholder collaborative framework and participatory action planning.

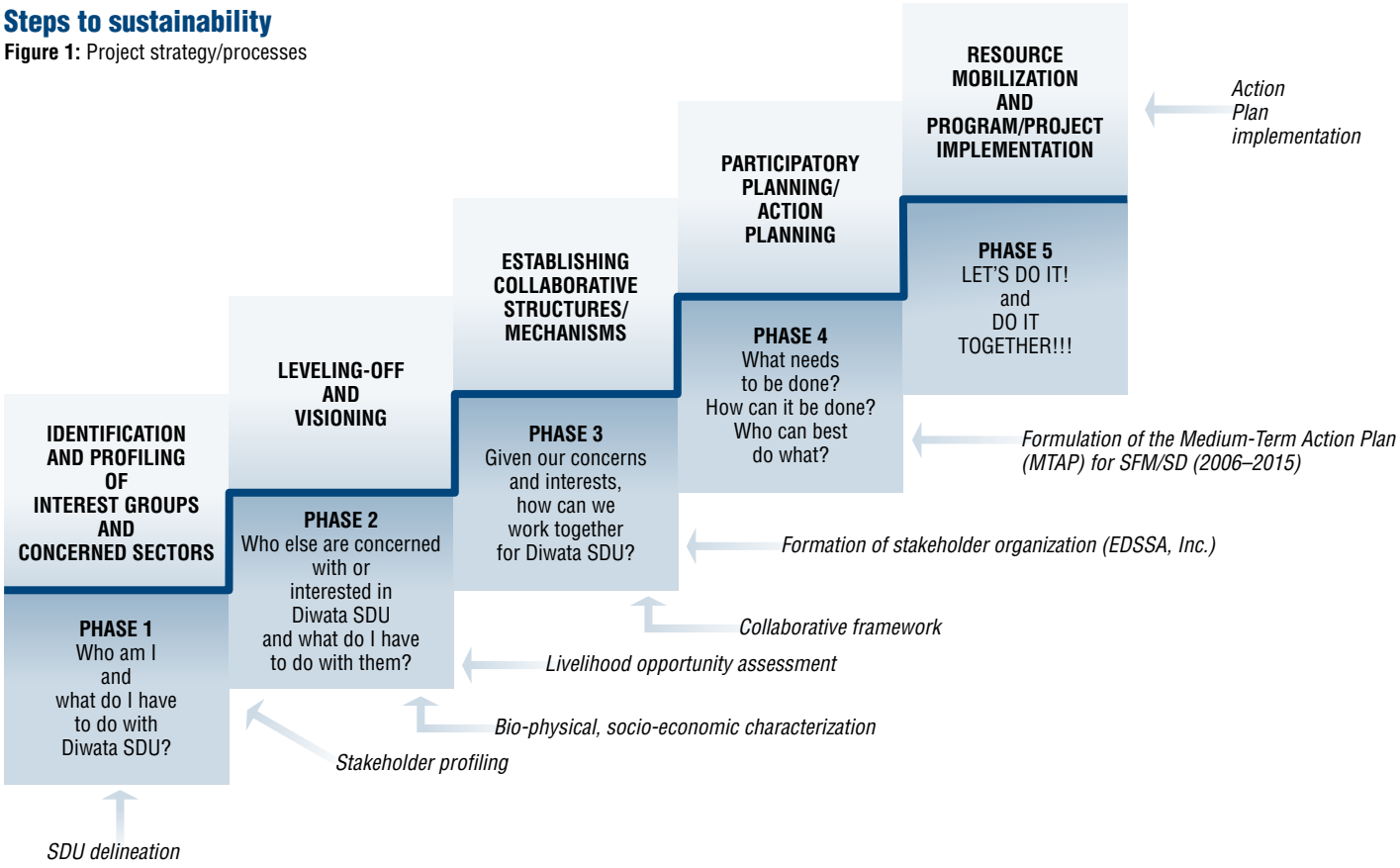
The stakeholders were provided with a collaborative framework and an action plan which will guide their future activities towards SFM in the SDU.

Impacts

The main impact of the project is providing the necessary model and participatory approaches to strengthen the forestry sector's input to integrated watershed and ecosystem management. It initiated a paradigm shift among participating stakeholders. The SDU paradigm favors

Steps to sustainability

Figure 1: Project strategy/processes



integrative thinking and made stakeholders realize how their interests (FMUs, ancestral domains, CBFM areas, etc.) were interrelated in the pursuit of sustainable development.

The stakeholders were provided with a collaborative framework and an action plan which will guide their future activities towards SFM in the SDU. They received management information/ tools and learned how to use C&I for forest management, monitoring and evaluation. They were assisted with identification and feasibility studies on priority livelihood projects and provided with seed money to start some priority collaborative projects. In short, the SDU and its various stakeholders were adequately provided with an institutional and management roadmap of the way forward to SFM through collaborative management.

Conclusions and recommendations

The project has demonstrated that FMUs can be effectively integrated within the larger SDU context through collaborative forest management amongst all key stakeholders. The development objective to have an integrated sustainable development framework to improve and accelerate SFM in the Philippines has been initiated at pilot scale at the East Diwata SDU. The progress towards SFM and sustainable development is a long-term and dynamic process which is reflected in the MTAP for SFM spanning 25 years. Priority livelihood projects have been identified and started initial operations. On-going and future projects by stakeholders supporting SFM can make use of the actions and guidelines in the action plan. The MTAP for SFM has initiated positive moves towards SFM. It needs to be internalized at all levels of the stakeholder organizations, including incorporating it into their operations plans.

The SDU paradigm has proven an effective integrator of the bio-physical and socio-economic dimensions of SFM and sustainable development and an effective instrument for mobilizing stakeholders to organize themselves within a collaborative framework and undertake participatory action planning aimed to attain SFM.

The project has demonstrated that FMUs can be effectively integrated within the larger SDU context through collaborative forest management amongst all key stakeholders.

The activities of the project should be replicated in adjacent forest-based SDUs and in other types of SDUs in other parts of the country. It can also be used as a model by other ITTO tropical timber producing members in emerging approaches to integrated watershed management linked to sustainable development as espoused by FAO and other international organizations and processes.

Technical assistance remains necessary to train all stakeholders in implementing the MTAP-SFM. Such assistance will strengthen the gains achieved by this ITTO-funded project. The key elements for a follow-up project include:

- capacity-building on SFM within the SDU paradigm;
- appropriate micro-enterprise support/micro-financing in poverty stricken areas;
- technical assistance and funding of collaborative livelihood projects, e.g. agroforestry, wood waste utilization, etc.; and
- adequate financial support for EDSSA, including identification and implementation of revenue generating projects for the association.

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ITTO Fellowship funds research on forest management impacts in Costa Rica

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AT PRESENT, it is widely recognized that ecosystem processes are influenced by functional traits and their interactions (Tilman *et al.* 1997), with functional diversity affecting resource dynamics in the short term and ecosystem stability in the long term (Díaz and Cabido 2001). Functional diversity is the type, range and relative abundance of functional traits present in a given community, which may be affected by man-induced changes in disturbance regimes (Díaz *et al.* 2007).

Plant functional types (PFTs) are a measure of functional diversity (Díaz and Cabido 2001) and are defined as sets of species showing similar responses to environmental conditions and having similar effects on the ecosystem (Díaz and Cabido 1997, Lavorel *et al.* 1998, Lavorel and Garnier 2002). Thus, PFTs bridge the gap between plant physiology and community and ecosystem processes (Díaz and Cabido 1997, Lavorel *et al.* 2007), making it possible to narrow down the high diversity of species into a limited number of groups showing similar responses to specific factors, compare flora species and communities with few taxonomic similarities, and, most importantly, understand the interactions between biodiversity, abiotic factors and ecosystem processes (Díaz *et al.* 2002).

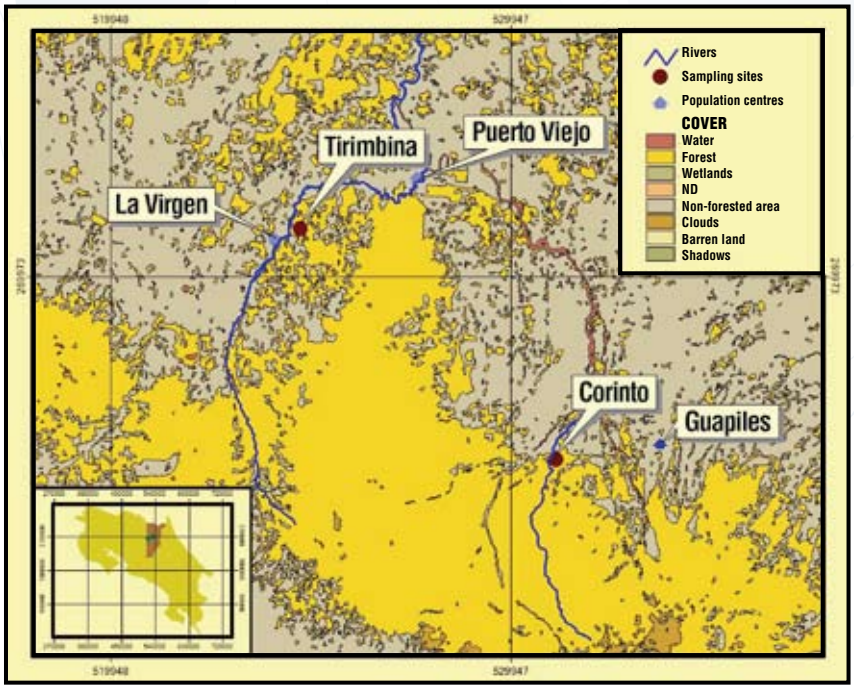
The functional analyses linked to long-term dynamics data on tree species (recruitment, mortality, growth) conducted during this research work are presented as a significant step forward in the understanding of the ecological behaviour of tropical forests and, particularly, in the understanding of tree community responses to disturbance. The objective of this research was to identify the functional types of tree species in two very moist tropical forests in the north-eastern region of Costa Rica and assess their response to varying intensities of disturbance caused by forest management activities.

Study areas

The forests in the areas under study belong to the Central American Atlantic Moist Forest Eco-region and are classified as vulnerable and outstanding areas at the bio-regional level (Dinerstein *et al.* 1995). The study areas are specifically located in the Tirimbina Rain Forest Center and in the Los Laureles de Corinto Demonstration and Research Area. Both areas are defined as 'very moist tropical forests' according to Holdridge's life zone classification system, with altitudes ranging from 160 to 350 m.a.s.l., annual rainfalls of 3800 to 4000 mm, and temperatures ranging from 23.5 to 24.5 °C (Finegan and Camacho 1999).

Plot locations

Figure 1: Moist tropical forest sites in La Tirimbina and Corinto forests, north-eastern Costa Rica



Each of the sites comprises nine 180m x 180m plots; at the center of each site there is a one-hectare (100m x 100m) permanent sample plot (PSP) with a 40-meter wide buffer strip. Three forestry treatments were conducted for each site with three replicates each (Finegan and Camacho 1999).

Methodology

The data used in this study were derived from 13–16 years of measurement of individuals with DBH ≥ 10 cm in 13 one-hectare permanent sample plots (PSP) located in selectively logged forests. Through a review of secondary information, five functional traits were identified for each of the 317 registered species, including three reproductive traits (dispersion type, pollination agent and sexual system) and one vegetative trait (adult tree height), while the absolute growth rate was determined through the analysis of PSP data. Using functional traits, conglomerate analyses were conducted to identify PFTs. Forests were classified into three levels (control, low and high) of disturbance, which was defined in terms of the percentage of basal area reduction caused by forest logging. A variance analysis was used to assess PFT response to disturbance focusing on the following variables: percentage of species and individuals; percentage of rare species and individuals; recruitment rate; mortality rate and basal area percentage.

Results

Five functional types were identified using stratum and growth rate traits *(Table 1)*, as reproductive traits were evenly distributed across all PFTs and did not assist in the differentiation of groups. Out of all plant functional types, PFT-5 showed the highest percentage of individuals, mainly

due to the high dominance of the *Pentaclethra macroloba* (Fabaceae) species, which has toxic seeds that are not easily preyed on and are tolerant to shade and infertile soils, and thus manage to survive and grow in the dense undergrowth of primary forests (Hartshorn 1983). This PFT and particularly *P. macroloba* are probably influencing many ecosystem processes because it has been widely recognized that the traits of dominant species are the ones that govern and direct such processes (Chapin *et al.* 1993, Cornelissen *et al.* 2003).

More than 50% of species were classified as rare at the local level (< 1 individual/ha) (Hubbell and Foster 1986); *Hyeronima alchorneoides* (Euphorbiaceae—PFT-4) and *Sclerolobium costaricense* (Fabaceae—PFT-3) were specially noted as species of high commercial value that are susceptible to a population decline in the area. Other species such as *Humiriastrum diguense* (Humiriaceae—PFT-5), (*Lecythis ampla* (Lecythidadeae—PFT-5) and *Vitex cooperi* (Verbenaceae—PFT-5) were not classified as rare but still showed low population densities, thus underscoring the limitations of these categories of abundance (Gallego and Finegan 2004) and the need to develop strategies for their management and conservation.

The percentage of individuals, recruitment rates and basal area percentage were the most sensitive variables for assessing the response to disturbance. Even though the mortality rate is a commonly used variable to assess forest dynamics, it has been widely documented that trees are more 'sensitive' to environmental changes in their seedling and juvenile stages at DBH < 10 cm (Hubbell and Foster 1990, Alvarez-Buyulla and Martinez-Ramos 1992, Clark and Clark 1992). Therefore, the mortality patterns recorded for adult individuals may not exclusively reflect their response to disturbance but may also be linked to the maximum longevity of species, species size and the number of forest clearings (Swaine *et al.* 1987, Hartshorn 1990), or to the mortality dynamics of each individual determined by limited resources or neighbouring competition (Sheil and May 1996).

Conclusion

The functional diversity approach can help to simplify and understand the functioning of tropical forests, where tree species diversity is so high and the range of responses and interactions in terms of environmental variables is so complex. However, it should be noted that this approach cannot be a substitute for taxonomic classifications and their capacity to classify genetic diversity, and should therefore be used as a complementary approach (Díaz *et al.* 2002).

Five groups

Table 1: Tree species functional types identified in La Tirimbina and Corinto

FUNCTIONAL GROUP	TRAIT STATUS		NUMBER OF SPECIES	NUMBER OF INDIVIDUALS
	Stratum	*Growth rate*		
PFT-1	Lower tree	Very slow to very fast	38 (11.99%)	412 (3.58%)
PFT-2	Medium tree	Very slow to slow	86 (27.13%)	2295 (19.96%)
PFT-3	Medium tree	Moderate to very fast	102 (32.18%)	2258 (19.64%)
	Upper tree	Fast to very fast		
PFT-4	Upper tree	Very slow to moderate	51 (16.08%)	1706 (14.84%)
	Emergent	Very slow to slow		
PFT-5	Emergent	Moderate to very fast	40 (12.62%)	4827 (41.98%)

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The complete Fellowshop report is available on request from fellowship@itto.or.jp.

Recently funded projects

Funding for the projects and pre-projects listed below was announced by ITTO in June 2008. A total of $430 000 was also provided in the first half of 2008 for 2008–09 Work Program activities, including workshops on criteria and indicators and forest law enforcement, ITTO fellowships, and for preliminary work on ITTO's* Status of Tropical Forest Management—2010 *report.

Value adding and kiln drying of commercial timbers by small scale community saw millers in Guyana, PD 401/06 Rev.2 (I)

Budget	ITTO	US$ 347 004
	Gov't of Guyana	US$ 73 295
	Guyana industry	US$ 40 000
	Total	**US$ 460 299**

Implementing agency The Guyana Forestry Commission (GFC)

The objective of this one year project is to train small scale community saw millers in commercial kiln drying techniques. Currently, an estimated 25% of Guyana's total wood production is from small to medium community enterprises (SMEs) employing on average five to ten people, and supplying mainly the domestic market with rough sawn green scantlings, although some of them export low value green dressed lumber to countries in the Caribbean (CARICOM) region. The ability to kiln dry their sawnwood output will improve the prospects for these SMEs on domestic and international markets.

Forest seeds management and conservation (Côte d'Ivoire), PD 419/06 Rev.3 (F)

Budget	ITTO	US$912 764
	Gov't of Côte d'Ivoire	US$546 746
	Total	**US$1 459 510**

Implementing agency Forest Development Corporation (SODEFOR)

The overall aim of the project is to contribute to the sustainable rehabilitation of Cote d'Ivoire's forests by developing a seed supply system having the capacity to provide high-quality products to meet the needs of the national forest rehabilitation stakeholders. The specific objective is to produce and supply forest seeds from plant stock of high genetic quality.

Conservation and utilization of medicinal plants in Ghanaian forest fringe communities, PD 424/06 Rev.2 (F)

Budget	ITTO	US$429 138.00
	Government of Ghana	US$107 955.40
	Total	**US$537 093.40**

Implementing agency Forestry Research Institute of Ghana (FORIG)

The development objective of this project is to develop conservation and sustainable utilization strategies for medicinal plant species within forest fringe communities of different ecological zones in Ghana. Specifically, it intends to document the distribution, utilization, conservation status (endangered, common) and conservation practices for sustainable supply of medicinal plants from three different forest ecological zones in Ghana.

Independent validation of legal timber in Ghana, PD 487/07 Rev.1 (M)

Budget	ITTO	US$473 040
	Government of Ghana	US$222 000
	Ghana industry	US$44 000
	Total	**US$739 040**

Implementing agency Ghana Forestry Commission

The purpose of this project is to further improve the sustainability of the forest management regime in Ghana by addressing weak forest control and law enforcement. This will be achieved by establishing a system for monitoring and validating legal timber in Ghana. The new system, which will build upon Ghana's existing paper-based log tracking system, will be overseen and managed by an independent agency, at arms length from the Ghana Forestry Commission.

The project will contribute to transparency and accountability in the forest sector, and to the Government of Ghana's strategy of improving public and private sector governance. It will also contribute to the goal of Ghana's Natural Resource Management Program (NRMP) and the institutional strengthening and policy reforms implemented over the past 10 years.

Strengthening capacity of forest law enforcement and governance in Cambodia, PD 493/07 Rev.1 (F)

Budget	ITTO	US$561 195
	Gov't of Cambodia	US$123 167
	Total	**US$684 362**

Implementing agency Forest Administration of Cambodia

The project aims to facilitate the implementation of the government's policy platform in combating illegal logging, forest clearing and land encroachment through the improvement of human resource capacity and the upgrading of operational means/equipment to ensure effective forest law enforcement and governance (FLEG) in Cambodia. In addition to FLEG-related training for staff members of the Forest Administration, selected local communities will be trained in how effective FLEG policies/implementation can benefit the community by protecting their interests in legal forest activities and ensuring their access to legal forest and non-timber forest products.

Study for the conservation, land management and sustainable mountain biodiversity management in the Centre North region of Togo, PPD 136/07 Rev.1 (F)

Budget	ITTO	US$52 358
	Gov't of Togo (DEF/MERF)	US$16 273
	Total	**US$68 631**

Implementing agency Direction des eaux et forêts (DEF)/MERF

This pre-project aims at contributing to the conservation, restoration and sustainable management of mountain biodiversity in the Centre-North region of Togo. Its goal is to improve the living conditions and environment of local communities, and to secure sufficient natural resources for present and future generations. It specifically intends to provide technical assistance for the development of a local community support project to conserve and sustainably manage mountain biodiversity in the Centre North region of Togo.

Strengthening of the national forest information system (Thailand), PPD 139/07 Rev.1 (M)

Budget	ITTO	US$84 505
	Gov't of Thailand	US$31 500
	Total	**US$116 005**

Implementing agency Royal Forest Department

The objective of the pre-project is to elaborate elements for the strengthening of the national forest information system (NFIS). The outputs of the pre-project are: a) a feasibility study elaborated for the strengthening of the NFIS with an action plan for priority activities; and b) an ITTO project proposal to implement relevant components of the action plan. The pre-project involves broad participation of stakeholders through thematic working groups, national and regional level workshops, and participation in the pre-project steering group.

ITTO members

Producers

Africa
Cameroon
Central African Republic
Congo
Côte d'Ivoire
Democratic Republic of the Congo
Gabon
Ghana
Liberia
Nigeria
Togo

Asia & Pacific
Cambodia
Fiji
India
Indonesia
Malaysia
Myanmar
Papua New Guinea
Philippines
Thailand
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Latin America
Bolivia
Brazil
Colombia
Ecuador
Guatemala
Guyana
Honduras
Mexico
Panama
Peru
Suriname
Trinidad and Tobago
Venezuela

Consumers
Australia
Canada
China
Egypt
European Community
- Austria
- Belgium
- Denmark
- Finland
- France
- Germany
- Greece
- Ireland
- Italy
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International pricing mechanism for plantation teak: a proposal to bring transparency to log markets

by
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International Co-ordinator
Teak 21
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SEVERAL SOURCES of plantation teak (*Tectona grandis* Linn. f.) prices are available worldwide. However, their use is limited because they are mostly unsubstantiated and lack precise information about log dimensions, time of data collection and what point along the value chain they refer to. In addition, few data exist that provide information at consecutive intervals through time. This is causing confusion amongst investors, allows unscrupulous parties to take advantage of the situation for their own ends and is hampering the development of a strong international, plantation-based commercial teak sector. A standard international pricing mechanism has been proposed to address this situation (Keogh 2007), focusing initially on logs, which are on offer across most of the species' geographic range, are traded internationally and for which prices are more easily standardized than for sawnwood. It would be relatively straightforward, however, to extend the mechanism to sawnwood, the price of which is ultimately derived from that of the log.

This paper provides an overview of teak prices from both natural forests and plantations. It then outlines the proposal for developing a standard international pricing mechanism to monitor plantation prices and suggests how it should be implemented.

Measuring up: Sri Lankan foresters checking diameter of good quality plantation teak. *Photo: R. M. Keogh*

International teak prices

Natural forests

Natural forest teak logs are sold through tenders in Myanmar utilizing a recognized international pricing mechanism which is based on log grading rules. The resulting prices of teak at monthly auctions in Yangon reflect the quality of the material offered and in worldwide demand. More information on these grading rules is supplied by U Thein Aung (2003). An overview of natural forest teak price trends over the past few years is presented in *Figure 1*, based on ITTO data for Myanmar published in its Market Information Service.

Unfortunately … prices for plantation teak logs are based on inadequate records and lack the required accuracy and specifications needed to eliminate widespread uncertainty and confusion …

Plantations

As mentioned previously, few reliable pricing data exist for teak plantations. Nonetheless, a total of 32 individual FOB prices, ranging over the period 1993 to 2007, were gathered from the sources outlined in *Table 1*. They represent diameters from 15 cm to over 50 cm. Data for 2004–2007 are shown in Figure 1 in real US dollars using the same deflator as used by ITTO for Myanmar teak.[1]

All the plantation teak log prices are significantly lower than the lowest Myanmar grade (SG-6), suggesting that the upper ceiling for plantation teak prices is, with few exceptions, lower than the lowest category of natural forest teak. Most plantation price data (79%) lie between US$150 and $250/m^3 (real prices), equivalent to between US$200 and $300 (nominal). No meaningful correlation was found between diameter and price for plantation logs although larger diameters, as would be expected, always fetch higher prices. Unfortunately, with few exceptions, there is not sufficient information to determine trends in real prices. Where consecutive data are available apparent upward international price adjustments from low bases prevented an assessment of real long-term price trends. For example, in Côte d'Ivoire teak accelerated from an artificially low base of US$60/m^3 in 1993 to $300 in 1997 before levelling off (see

[1] *Real prices were FOB in constant 1990 US$/m^3 deflated by the IMF's Consumer Price Index for industrial countries and conformed to the approach as outlined in ITTO (2005a).*

Data

Table 1: Teak plantation log prices collected

COUNTRY	YEAR(S)	NO. OF PRICES	REFERENCE
CÔTE D'IVOIRE	1993, 1997, 1998	3	Maldonado & Louppe 2000
C & S AMERICA	1996	2	De Camino *et al.* 2002
MYANMAR	2004	2	Tennigkeit, *et al.* 2005
KENYA	2005	1	Tennigkeit *et al.* 2005
GHANA	2000	2	Armstrong *et al.* (nd)
GUATEMALA	2006, 2007	15	ITTO (2006 and 2007)
PNG	1998	3	ITTO (2005b)
LIBERIA	1998	4	ITTO (1998)
TOTAL		32	

Maldonado and Louppe 2000). Steep price adjustments like these provide a false perspective of the long-term valuation of teak logs.

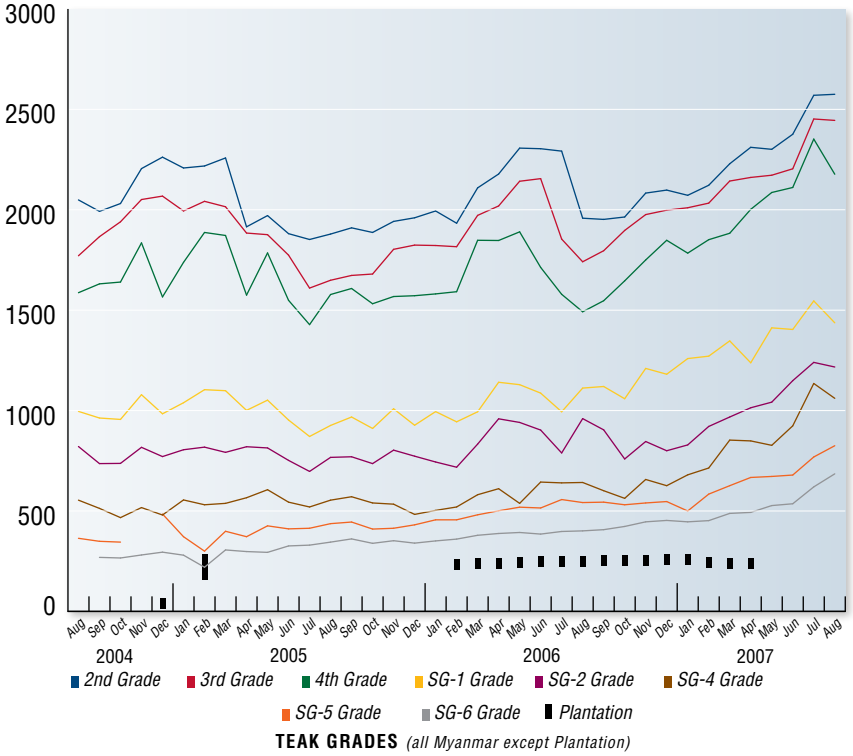
It is difficult to validate the current price range presented for plantation teak logs (US$200–$300/m³). However, allowing up to US$100/m³ for freight and insurance costs would bring the CIF figure to US$300–$400/m³ and this corresponds broadly with a report from the urban city of Chennai in India, which imports plantation teak logs from West Africa, Colombia and Brazil at prices ranging from US$300–$500/m³ (Muthoo 2004).

In addition to the limited data summarized in Table 1 and Figure 1, ITTO recently published plantation teak log price information from the International Teak Workshop held in Kerala, India (ITTO 2007). These figures suggest that top quality logs from Indonesia and Costa Rica (diameters over 30 cm) may surpass the nominal US$300/m³ (FOB) mark, with exceptional logs fetching upwards of US$400. According to this source certified logs from Costa Rica are expected to gain a 20% price premium over uncertified logs.

Unfortunately, all the above prices for plantation teak logs are based on inadequate records and lack the required accuracy and specifications needed to eliminate widespread uncertainty and confusion surrounding plantation teak log prices. The solution is to develop and implement a standard pricing mechanism.

Natural vs. plantation

Figure 1: Real prices (1990 US$/m³) of natural forest and plantation teak



Developing a standard pricing mechanism

To be effective a standard pricing mechanism for plantation teak must deal comprehensively with the entire value chain from standing tree to FOB price point (and may extend to CIF). The proposed approach is as follows:

1) Focus initially on teak plantation export logs as the international benchmark;
2) Develop standards on which the pricing mechanism is to be established; and
3) Propose how the mechanism would be promoted and implemented.

Developing standard grading rules

The first step in creating standards for the pricing mechanism is to develop standard grading rules for plantation teak logs. To achieve this, precise definitions of volumes and quality must be devised/agreed upon. Volume definitions need to differentiate between standing volumes and log volumes. Three standing volume definitions are proposed:

- merchantable volume is defined as the total woody tissue in the main stem, under bark, from ground level to 8 cm under bark top diameter;
- commercial volume is defined as the total woody tissue in the main stem, under bark, from ground level to a determined top diameter; for the purposes of the pricing mechanism it is the volume that can be sold on the international market; and
- residual volume is defined as the difference between merchantable and commercial volumes.

The standard dimensions of teak log volumes are derived from commercial volume. In order to determine quality, the following must be taken into consideration:

- dimensions of the log: diameter (cm) at both ends (or mid-diameter) and total length (m);
- cylindrical tendency (the more the log approaches a true cylinder in terms of roundness—absence of fluting—and low taper, the higher the quality);

- wood quality (percentage heartwood, colour, homogeneity of colour, number of rings per cm, strength and hardness are the primary characteristics of quality teak; durability is important particularly for certain end uses like garden furniture);
- defects (the less defects that are present, the higher the log quality; defects include knots, splitting, shake, heart rot, etc).

Standard international grading rules for plantation teak must be agreed and these standards should be developed on the basis of the characteristics that are outlined above. Caution is advised against creating a highly complex system. For these reasons, the following grades of logs, based on diameters, log lengths and quality are recommended to initiate the system:

1. DIAMETER CLASS *(cm)*
15 – 19.9
20 – 24.9
25 – 29.9
30 – 34.9
35 – 39.9
40 – 44.9
45 – 49.9
50 +

2. LOG LENGTHS *(m)*	
Short	1 – 2.6
Medium	2.6 – 5
Long	> 5

3. QUALITY CLASS	
A	Logs straight, sound and cylindrical throughout the length;
B	Straight and sound logs without defects (not entirely cylindrical);
C	Logs with minor defects; and
D	Logs with defects.

From the initiation of the scheme, particular emphasis must be placed on the proportion of heartwood available in each class. More sophisticated quality parameters can be introduced at a later stage and refined on a continuous-improvement basis during the promotion and implementation phase of the mechanism.

Implementation

Agreement from international stakeholders on the proposed norms and standards is required if a formal pricing mechanism is to be developed. However, this would be a long-term measure. Alternatively, a method of rapid spot-checks of teak along the value chain is recommended as a short-term solution. The objective of these 'snapshots' is to estimate the value of teak based on the proposed grading rules and at fixed points along the value chain between standing tree and port, carried out in a number of countries (e.g. two countries in each of Asia, Latin America and Africa) at a specified time(s). Snapshots of this type would provide a rapid benchmark for plantation teak prices worldwide. It would be relatively simple to update the snapshots annually or periodically, which would also provide data on price trends. Whatever system is used it must:

- be applied in a standard and transparent manner at the same time across teak growing countries;
- publish up-to-date and accurate international information on plantation teak prices; and
- update information on a regular basis.

The output from the snapshots or a more complex international system of norms and standards would bring transparency to plantation teak log pricing and is likely to speed up the process of price adjustments.

Conclusion

There is an urgent need to develop and implement an international pricing mechanism for teak plantations. The proposed mechanism is likely to have a significant and positive impact on the entire teak sector as its implementation would bring transparency to teak pricing. It may be implemented informally at first in a number of key countries in the tropics. With a relatively small input in terms of human and financial resources, it would produce immediate results and provide a rapid benchmark for plantation teak prices worldwide.

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The US Forest Service International Programs International Seminar on Watershed Management,

Arizona, USA

23 March –11 April 2009

Cost: $6000 (fees do not include transportation to and from the Seminar)

Application Deadline: October 17, 2008

This seminar, sponsored by the US Forest Service International Programs, is designed for mid-career watershed management professionals who desire to take part in an interactive and intensive training and exchange program on integrated watershed management.

To learn more *about or to apply for this seminar, visit www.fs.fed.us/global/is/watershed/welcome.htm.*

Short Courses at CAZS Natural Resources

Bangor University, Wales UK

Various dates throughout the year

Cost: Tuition fees begin at around £2 700 for one standard 3 week module (fees include course, full access to University library and computing facilities, reasonable printing and photocopying access, any relevant field trips)

CAZS-NR have for many years provided short courses in a number of natural resources- and environment-based topics. These currently range from simple, 3 or 6 week courses based around existing MSc modules, with the addition of tuition, practical work and visits tailored to the specific requirements of the participants, up to fully bespoke 12-week courses designed in response to the requirements of a particular sponsor (e.g. Environmental Management and Sustainable Development designed for young Indian professionals in government, NGOs and industry). The module-based courses are ideal for rural development workers who cannot spend long periods away from their place of work, but want exposure to recent scientific advances. They are a flexible option for extending knowledge and professional skills, and expanding career options. For the module-based courses, fees are reduced for more than one student. The more specialized courses provide an opportunity for in-depth study or training in a particular area of interest, and are suited to those who need to develop particular skills for existing or new job responsibilities.

Visit *www.cazs.bangor.ac.uk/ccstudio/CourseInfo/cazscourses_Overview.php for more details.*

Master's Degree in Management, Access and Conservation of Species in Trade: The International Framework

International University of Andalusia, Spain

Date: 7th course on-going; contact UIA for details of 8th course

The International University of Andalusia, known by its Spanish acronym UIA, has developed a Master's Degree program in Management, Conservation, and Control of Species in International Trade in collaboration with the government of Spain and the CITES Secretariat. The program is taught in Spanish and English. The seventh Masters course (2007–2009) is currently in progress. Applications for the 8th course are likely to be sought in 2009.

The general objective of this program is to provide specialized high level training in the scientific bases, techniques and instruments that make it possible to implement and develop major multilateral environmental agreements (MEAs), specifically the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on Biological Diversity (CBD). It is appropriate for people who are involved in, or wish to become involved in, environmental-related policy-making, in the implementation of international agreements or development of the scientific and technical work required for their implementation at the executive level.

Specialized training is provided to participants in areas such as:

- the concept of biodiversity;
- proper implementation of CITES;
- administrative, legal and enforcement aspects of CITES implementation;
- biological and trade aspects of CITES listings;
- significant trade reviews under CITES;
- assessments for non-detriment findings under CITES;
- identification techniques for specimens of CITES listed species;
- CBD/CITES relationship and synergies;
- EU CITES provisions and implementation;
- use of GIS for monitoring endangered species;
- impact of invasive species on biodiversity;
- species conservation techniques (e.g. germplasm preservation, in vitro cultivation); and
- general concepts of environmental management with relation to CITES and CBD.

Contact *Antonio Machado for further information regarding this program (dates of 8th course, registration fees, class size, opportunities for financial assistance); Machado@unia.es; www.unia.es.*

Courses are in English unless otherwise stated. By featuring these courses ITTO doesn't necessarily endorse them. Potential applicants are advised to obtain further information about the courses of interest and the institutions offering them.

UNIDO Young Professionals Program

Application Deadline: *31 October 2008*

Contact: *www.unido.org > Employment*

The Young Professionals Program (YPP) is an entry point for young development professionals interested in a career with UNIDO or related international organizations. By establishing the YPP, UNIDO wishes to ensure that it remains responsive to the evolving environment and the changing requirements of its member states. In that context, the objectives of the YPP are to infuse a steady flow of talented and motivated young professionals (YPs) into the Organization, to facilitate succession planning and knowledge retention, while providing an opportunity to the selected YPs to launch a challenging and rewarding professional career in an international development organization.

UNIDO's mandate is geared towards reducing poverty and promoting sustainable industrial development. Successful candidates will be recruited for the following areas:

- strategic research;
- agri-business development;
- trade capacity building;
- investment and technology promotion;
- energy and climate change;
- industrial policy and private sector development; and
- environmental management

The YPs will undergo extensive training and be exposed to a wide range of activities, including in some cases field operations once the initial training period is completed. They will have the status of staff members; initially at the P-1 level of the United Nations Salary Scale.

Recent editions

Edited by Ken Sato

ITTO. 2008.* Community-Based Forest Enterprises. ITTO Technical Series 28. *Yokohama, Japan.

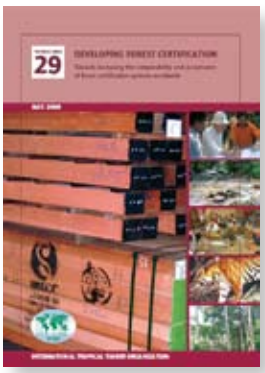
Available from: *ITTO Secretariat (see page 2 for contact details); online under Publications at www.itto.or.jp*

This report examines the role of community-based forest enterprises (CFEs) in tropical timber producing countries which are increasingly becoming significant players in the domestic and global market places. It surveys enterprises in both the formal and informal forest sectors, such as those that participate in payment schemes and markets for environmental services. It provides market, social and political contexts within which they operate, presents an overview of case studies, analysis of case-study findings, and summarizes the lessons learned as well as making recommendations for the future.

Available in English.

ITTO. 2008.* Developing Forest Certification. ITTO Technical Series 29. *Yokohama, Japan.
ISBN 4–902045–39–7

Available from: *ITTO Secretariat (see page 2 for contact details); online under Publications at www.itto.or.jp*

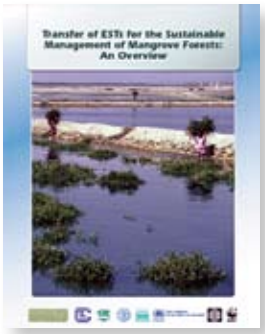


This report reviews and assesses progress in the comparability and equivalence of forest certification systems, particularly of the promotion of tropical timber certification. It is needed because of the proliferation of both certification systems and the market requirements for such systems in the public and private sectors of tropical timber importing countries. Aims of the study included the collecting and analyzing of information on forest certification and chain of custody certification; identifying and recognizing appropriateness of each system; reviewing various mechanisms and initiatives; reviewing current and emerging market requirements and preferences; and suggesting areas of cooperation with regard to certification of tropical timber, including arrangements and possible incentives for implementation by phases which include legal compliance.

Available in English.

Vidal, O. and Illueca, J.E. 2008.* Transfer of ESTs for the Sustainable Management of Mangrove Forests: An Overview. *World Wildlife Fund, Mexico.

Available online at: *www.wwf.org.mx/wwfmex/descargas/vidal_illlueca_mangroves2008.pdf*



This paper was initially submitted as a working document to the 'Government-designated Expert Meeting on the Transfer of Environment-ally-sound Technologies for the Sustainable Management of Mangrove Eco-systems in Latin America and the Wider Caribbean', held in Managua, Nicaragua, 3–5 March 2003, as part of an initiative led by the Government of Nicaragua. The present version of the document incorporates the outputs and recommendations of that meeting. It was co-sponsored by ITTO together with FAO, the United Nations Forum on Forests (UNFF) Secretariat, the Secretariat of the Ramsar Convention on Wetlands, the Caribbean Environment Programme (CEP) of the United Nations Environment Program (UNEP) and Central American Commission for Maritime Transport (COCATRAM), with the participation of the World Bank, the Central American Bank for Economic Integration, the United States Agency for International Development (USAID) and Japan International Cooperation Agency (JICA). This document analyzes the critical functions provided by mangroves worldwide. It contains a number of pertinent recommendations for their conservation, restoration and sustainable management.

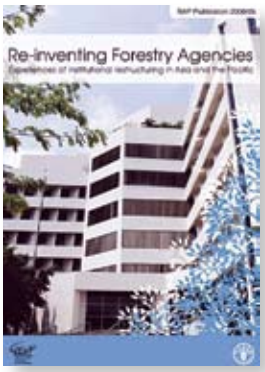
RECOFTC, FAO and SNV. 2007.* Sharing the wealth. *Regional Community Forestry Training Center for Asia and the Pacific (RECOFTC). Bangkok, Thailand.
ISBN 978–974–8062–23–5

Available online at: *www.recoftc.org/site/fileadmin/docs/Events/CF_Forum/SHARING_THE_WEALTH_v9.pdf*

This document presents a synthesis of the discussions from the Second Community Forestry Forum in Bangkok, Thailand from March 21–22, 2007. The Forum was convened to share experiences among peers regarding the equitable distribution of benefits and costs of community forestry. It is a useful resource for those within and outside government who share an interest in harnessing community forestry to support poverty reduction and sustainable forest management.

FAO. 2008.* Re-inventing Forestry Agencies: Experiences of institutional restructuring in Asia and the Pacific. *Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific, Bangkok, Thailand. ISBN 978–974–06–1218–6

Available from: *P. Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; Patrick.Durst@fao.org; sansiri.visarutwongse@fao.org;* ***Available online at:*** *www.fao.org/docrep/010/ai412e/ai412e00.htm*



This publication is a compilation of nine case studies of forestry agencies in countries around the Asia-Pacific region. Analysis reveals some clear factors determining the effectiveness (or ineffectiveness) of forestry institutions, and outlines commonalities and differences in the course followed by different countries in responding to calls for change. The analysis further identifies major trends related to forest management including the devolution of powers and responsibilities to a range of actors and recognition of the multiple functions of forests and the conflicts that may arise between these functions. A trend towards separation of regulatory and strategic roles from implementation functions—and corresponding restructuring of agencies and redirection of funds—is noted.

This publication is intended to offer insights into the approaches and rationales that have supported restructuring and re-invention of forestry agencies. Through comparative analysis, the publication offers recommendations on institutional structures, functions, and strategies to appropriately respond to the rapidly changing forestry environment.

International Institute for Environment and Development. 2008. **Towards a global forest partnership: Consultation, assessment and recommendations.** ***Final Report. IIED, London, UK. ISBN: 978–1–84369–711–4***

Available online at: *www.iiedgfpconsultation.org/*

This report presents the findings of an independent consultation conducted by the International Institute for Environment and Development (IIED) on the World Bank's preliminary idea of a new global forest partnership. It suggests an approach that responds positively to stakeholders' opinions and to analysis of recent experience.

The report proposes the development of an inclusive, forest stakeholder-driven partnership with global ambition, which could be expected to empower forest stakeholders by: making real connections within the forest sector and across other sectors; increasing responsibility for, and local benefits from, forest global public goods; and by improving the quantity and quality of forest investment.

Summary versions of this report are available in French, Spanish and Portuguese at www.iiedgfpconsultation.org and www.iied.org/pubs.

Sunderlin, W.D., Hatcher, J. and Liddle, M. 2008. **From Exclusion to Ownership? Challenges and Opportunities in Advancing Forest Tenure Reform.** ***RRI, Washington DC, USA. ISBN 978–0–615–21808–3***

Available online at: *www.rightsandresources.org/publication_details.php?publicationID=736*

This report finds that governments are reducing their legal ownership and control of the world's forests according to a survey of 25 of the world's 30 most forested countries between the years 2002–2008. During that period, the area of state ownership declined, while there were corresponding increases in the area of forests designated for use by communities and indigenous peoples, the area owned by communities and indigenous peoples, and the area owned by individuals and firms.

The report concludes that where implemented appropriately, many countries and millions of rural people will benefit from such reform and forests will be better managed. Moreover, the clarification and strengthening of forest tenure will help address issues such as conflict and war, poverty, and climate change. The report includes recommendations on how governments can improve, launch or accelerate forest tenure transition.

Rights and Resources Initiative. 2008. **Seeing People Through The Trees: Scaling Up Efforts to Advance Rights and Address Poverty, Conflict and Climate Change.** ***RRI, Washington DC, USA. ISBN 978–0–615–21842–7***

Available online at: *www.rightsandresources.org/publication_details.php?publicationID=737*

This report references past models of forest management to demonstrate weaknesses in governance structures while emphasizing gaps and opportunities for the strategic involvement of the international community. The key messages and recommendations to emerge are addressed to the global development community, governments and civil society regarding their roles in forest tenure reform and improved governance.

Topical and tropical

Edited by Ken Sato

Orangutans fading to black

Orangutans may face extinction sooner than previously expected according to a new study published in Oryx—*The International Journal of Conservation*. The lead author (Dr Serge Wich of the Great Ape Trust of Iowa) and other orangutan conservation experts revealed that by using improved assessment methodology, their research shows there are lower numbers of orangutans on the islands of Sumatra and Borneo than previously reported.

Orangutans living outside of national parks are quickly losing their homes to illegal logging, mining, encroachment by palm oil plantations, and fires. The lack of enforcement in conservation management strategies is a major cause for the rapid decline in orangutan populations. However, recent actions are showing that forest conservation is becoming a more important issue in regional political agendas. A temporary logging moratorium in an area of Sumatra has stabilized orangutan habitat, while opportunities to develop reduced-impact logging systems may help on the island of Borneo. However, the study claims that the orangutan may be the first great ape to go extinct unless extraordinary efforts are made soon.

Sad news: The orangutan may soon face extinction due to illegal logging, mining, encroachment by palm oil plantations, and fires. *Photo: Sarawak Forestry Department*

Hidden tribe threatened by alleged deforestation

Rare photos of an uncontacted tribe living near the Brazilian-Peruvian border made major international news in May 2008. Although the tribe's existence had been on record since 1910, the recent confirmation of their continued presence in that area drew attention to logging activities and alleged deforestation taking place on the border of Peru and Brazil. These activities may threaten the environment as well as the existence of such tribes living in those areas.

In a mission to confirm that tribes in that area were flourishing under Brazil's no contact and protection policy, experts on indigenous tribes from the Brazilian Indian Protection Agency (Funai) were able to track down the tribe using an aircraft, GPS data and Google Earth coordinates and maps. Survival International (www.survival-international.org/) and Funai, the organizations that released the photographs, justified their decision to publicize the tribe's existence since the media attention caused Peru to re-examine its logging policy in the area where the tribe was photographed. Survival International estimates that there are over 100 such uncontacted tribes worldwide.

Leave us alone: Uncontacted Indians in western Brazil, May 2008. *Photo: Gleison Miranda/Funai*

EU, Ghana sign illegal timber deal

The European Union (EU) and Ghana recently signed a Voluntary Partnership Agreement (VPA) under the EU's Forest Law Enforcement, Governance and Trade (FLEGT) program that is designed to stop illegally felled timber from Ghana from entering the EU market. The Agreement is regarded as a landmark deal to fight illegal timber trade by ensuring that all timber exported from Ghana is certified as legal. World Bank statistics indicate that up to 60% of Ghana's logging in recent years has been classified as illegal.

The VPA requires Ghana to impose stricter controls on forestry activities ranging from remote harvesting operations to timber handling at export ports. The EU, which consumes more than 50% of Ghana's timber exports (worth over US$400 million a year), will ban entry to shipments of Ghana's timber that are not verified, audited and licensed as being of legal origin under the VPA. By signing the VPA, Ghana hopes to gain a competitive edge in the EU market. Cameroon, Congo, Gabon, Indonesia and Malaysia are all currently involved in VPA negotiations with the EU.

Study pinpoints deforestation hotspots

A new study published in the journal *Proceedings of the National Academy of Sciences* (PNAS) provides the most accurate assessment of tropical deforestation to date.

The main finding is that deforestation is focused in certain 'hotspots' rather than being widely dispersed over multiple locations and countries, according to the collaborative study conducted by the World Resources Institute and other researchers. According to their analysis, over 60% of the world's deforestation is taking place in two countries, with Brazil responsible for 48% of global deforestation and Indonesia responsible for 13% (mostly in just two peat-land areas). Deforestation in Africa was relatively insignificant in comparison.

The study implemented a new method of combining satellite systems to pinpoint areas of forest loss and calculate changes within areas throughout the tropics. The approach largely eliminates human bias and differences in methodologies and allows large-scale analyses to be completed accurately, consistently and in a timely manner. The results of this study should prove instrumental in helping governments and other forestry stakeholders to target areas where deforestation is taking place and focus efforts in these problem areas.

Brazil rounds up cattle for rainforests

The Brazilian government has seized livestock grazing illegally in the Amazon, according to recent reports by the Associated Press. Government officials seized 3100 head of cattle they claim were raised on an ecological reserve in the state of Para. This move was to serve as a warning to other ranchers who are using illegally deforested land in Amazonia to graze cattle. Herds of up to 60 000 cows are being grazed on such land, according to environment minister Carlos Minc.

Mr Minc pledged that tougher enforcement measures would be directed at "those that don't respect environmental legislation". Seized cattle are to be auctioned off and the proceeds to go to Fome Zero, the government's food program, as well as to health programs for indigenous peoples and to finance the cattle seizure program.

Although annual deforestation figures fell to a 16 year low in 2007, government agencies reported this year that forest clearing was on the rise again, blaming the cattle farmers for much of the increase.

Deforestation debate in PNG

A study recently conducted by the University of Papua New Guinea (UPNG) and Australian National University (ANU), based on satellite images taken over three decades from the 1970s to 2002, claims that forests in PNG are being cleared quickly and that more than half of its trees could be lost by 2021.

The release of this report has created controversy, however, with one resource expert (also from ANU) calling its findings "grossly exaggerated". This expert (quoted in *Forestry and Development E-News*) claims that the study incorrectly represents the true state of PNG deforestation by combining figures for deforestation and forest degradation, and assuming that all degraded areas would succumb to complete deforestation. Critics have also lashed the report's focus on the commercial timber industry as a major driver of deforestation, claiming that fuelwood removals and agriculture development were in fact major factors behind the problem.

Garden cities bloomed in Amazon

The journal *Science* recently published a paper stating that the Amazon rainforest was at one time an immense sprawl of interconnected villages.

Researchers consisting of anthropologists from universities from the USA and Brazil, together with members of the Kuikuro, an Amazonian indigenous tribe descended from the region's original inhabitants, spent more than a decade studying, mapping and uncovering lost and hidden communities in the Xingu region of the Brazilian Amazon with the aid of satellite images. They found that the communities were part of a larger network of towns and villages each with a similarly oriented central road connected to a central plaza and dating from between 1500 and 500 years ago.

These garden cities were spread out over a diameter of up to 250 km, covering areas of almost 5 million ha but with only about 50 000 people spread throughout the many interconnected settlements that each housed upward of 1000 inhabitants. Remains of dams and artificial ponds were found around settlements which could indicate that the inhabitants farmed fish, a potentially viable livelihood option for indigenous tribes in the region today. The largest such settlements were dated at between 1000 and 500 years old, with their (and their inhabitants') subsequent demise presumed to be a result of contact with disease-carrying Europeans.

The settlements are almost completely overgrown now but the Kuikuro (who are adept at identifying tell-tale signs of old settlements, from 'dark earth' that indicates past human waste dumps or farming, concentrations of pottery shards and earthworks) were able to help the researchers to locate various reference points on which to focus the satellite analysis.

Although the Amazon rainforest is often thought of as pristine, this discovery shows that the region's forests have been shaped by human activity for many centuries. The researchers conclude that the existence of such settlements in the Amazon will influence future conservation and management strategies in the region, as well as challenging stereotypes regarding the relative sophistication of the development of old-world versus new-world urban planning.

Assistance for timber traders

The Timber Trade Action Plan (TTAP) is a 7 year project that began in March 2005 and is co-funded by the European Commission, participating timber trade federations and their members. It was developed by the European timber trade federations (TTFs) to assist their suppliers to deliver verified legal timber to the EU. TTAP is managed by the Tropical Forest Trust (TFT) who provides technical expertise to timber suppliers in Africa, Asia, China and South America to help them supply verified legal timber to the importer.

TTAP's main task is to help tropical suppliers demonstrate that their timber is legal. As a key project in the EU's forest law enforcement, governance and trade (FLEGT) program, TTAP also aims to help to: develop European trade federations' purchasing policies to ensure consistency with government buyers and FLEGT requirements; provide guidance to buyers on how to meet EU requirements on legality and chain of custody; and minimize the risk of illegal wood entering a supply chain. However, the core objective of TTAP remains to ensure the legal verification of at least 70 supply chains in the following producer countries: Malaysia, Indonesia, China, Gabon, Cameroon, Congo Brazzaville, Bolivia, Brazil, Guyana and Suriname.

TTAP is open to members of timber trade federation partners. Members interested in taking part in TTAP and benefiting from TFT's expertise and the EU's financial support can apply through their trade federation. Producer country companies should approach TTAP to investigate how to get involved.

To find out more visit the TTAP website: www.timbertradeactionplan.info

ITTO assistance is also available to companies and governments in producer member countries to demonstrate the legality of their timber exports. For details contact: itto@itto.or.jp.

Meetings

5–14 October 2008. **IUCN World Conservation Congress: A diverse and sustainable world**. Barcelona, Spain. ***Contact:*** *IUCN World Conservation Congress Registration Office; c/o JPdL, 1555 Peel Street, Suite 500, Montréal, Québec, H3A 3L8, Canada; Tel +1 514 287–9898 ext.248; Fax +1 514 287–1248; iucn-wcc2008-registration@jpdl.com; www.iucn.org/congress*

6–7 October 2008. **Working forests in the tropics**. Gainesville, Florida. ***Contact:*** *Jhanna Gilbert, Conference Coordinator; Office of Conferences and Institutes (OCI), University of Florida/IFAS, PO Box 110750, Building 639, Mowry Road, Gainesville, FL 32611–0750; Tel 352–392–5930; Fax 352–392–9734; jhanna@ufl.edu; http://conference.ifas.ufl.edu/tropics/*

7 October 2008. **Biofuels in developing countries: opportunities and risks—A CGIAR-Alliance Bioenergy Platform biofuels symposium at the 2008 joint meeting of the ASA-CSSA-SSSA**. Houston, Texas. ***Contact:*** *bioversity@cgiar.org; www.bioversityinternational.org*

7–9 October 2008. **International symposium on forest governance**. Pereira, Risaralda, Colombia. ***Contact:*** *bosquesflegt@carder.gov.co, rudamor@carder.gov.co; www.carder.gov.co*

20 October 2008. **The roles of wood in green building and green building effects on the forest sector in the UNECE region** (European Forest Week event). Rome, Italy. ***Contact:*** *Carl-Éric Guertin, UNECE/FAO Team of Specialists on Forest Product Markets and Marketing; Communications and Responsible Trade Manager, Quebec Wood Export Bureau; 979, avenue de Bourgogne, suite 540, Québec G1W 2L4 CANADA; Tel +1 418 650 6385; ceguertin@quebecwoodexport.com; www.unece.org/trade/timber/workshops/2008/Green%20Building-Rome/welcome.htm*

20–24 October 2008. FAO European Forestry Commission—34th Session. Rome, Italy. ***Contact:*** *FAO Forestry Department; www.fao.org/forestry/site/31095/en/*

27 October 2008. **International Timber Trade Federation Day—Responding to changing market requirements**. Geneva, Switzerland. ***Contact:*** *Emily Fripp, EU Timber Trade Action Plan, Director Donor Program, Tropical Forest Trust; Tel +41 22 367 9443; ttap@tropicalforesttrust.com; www.tropicalforesttrust.com, www.timbertradeactionplan.info*

3–8 November 2008. **Forty-fourth Session of the International Tropical Timber Council and associated Sessions of the Committees**. Yokohama, Japan. ***Contact:*** *ITTO Secretariat; Tel 81–45–223-1110; Fax 81–45–223-1111; itto@itto.or.jp; www.itto.or.jp*

November 13–15. 5th **China international wood and wood products trade conference**. Guangzhou, PRC. ***Contact:*** *Beijing Zhonglin Huida International Exhibition Co. Ltd, Room A-405 China Post Science Academy, Xisanqi, Haidian District, Beijing city, China; Tel/Fax 0086–10–82920181; woodtrade2007@yahoo.com.cn* ***or*** *woodfair@sina.com; www.mujiaohui.com*

17-19 November 2008.**Sustaining merbau workshop**. Singapore. ***Contact:*** *Tong Pei Sin, Traffic Southeast Asia; tongps@myjaring.net*

17–20 November 2008. **The FORTROP II international conference: tropical forestry change in a changing world**. Kasetsart University Bangkok, Thailand. ***Contact:*** *FORTROP II Secretariat; Faculty of Forestry Kasetsart University, 50 Phaholyothin Rd. Chatuchak Bangkok 10900 Thailand; Tel 662 579 0170; Fax 662 561 4246; FORTROP2008@ku.ac.th; www.forest.ku.ac.th/FORTROP2008/main/index.php*

17–22 November 2008. **Expert meeting on CITES non-detriment findings**. Cancun, Mexico. ***Contact:*** *Rafael Navarro; Ir1nacer@uco.es; www.cites.org*

19–21 November 2008.**IV International Congress on Solid Wood Products from Plantation Forests**. Curitiba, Brazil. ***Contact:*** *Tel 55 41 3225-4358; www.congressoflorestaplantada.com.br; wrsp@wrsaopaulo.com.br*

20–22 November 2008.**World Biodiversity Congress**. Chiang Mai, Thailand. ***Contact:*** *Dr. V. Sivaram, Department of Botany, Bangalore University, Bangalore – 560056, India; Tel 91–80–22961315 sivaram900@gmail.com*

24–26 November 2008. **Legality of traded timber: the development challenges** (international workshop). Rome, Italy. ***Contact:*** *Eva Muller, Chief Forest Policy Service, Forestry Department, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy; Tel (+39) 06 570 54628; Fax (+39) 06 570 55514 eva.muller@fao.org;* ***or*** *David Brown, Director – the VERIFOR Project, ODI, 111 Westminster Bridge Road, London SW1E 7JD, UK; Tel 44-20-7922-0329; d.brown@odi.org.uk*

1–12 December 2008. **UNFCCC Conference of the Parties (COP), Fourteenth session and Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP), Fourth session and sessions of the Subsidiary Bodies**. Poznan, Poland. ***Contact:*** *http://unfccc.int*

6 December 2008. **Forest Day 2 (UNFCCC COP 14 parallel event)**. Poznan, Poland. ***Contact:*** *Cifor-forestday@cgiar.org; www.cifor.cgiar.org/Events/COP14-ForestDay/forest_day2008.htm*

8–10 December 2008. **International workshop on promotion of rubberwood processing technology in the Asia-Pacific region**. Sanya, Hainan, PRC. ***Contact:*** *Dr Zhao Youke or Ms Xiong Manzhen, Research Institute of Wood Industry, Chinese Academy of Forestry, Wan Shou Shan, Beijing 100091, China; Tel 86–10–6288–9407* ***or*** *86–10–6288–9412; Fax 86–10–6288–1937; youke.zhao@htomail.com* ***or*** *kjc.mg@caf.ac.cn; www.paneltech.cn/rubberwood/workshop.htm*

16–20 March 2009. **FAO Committee on Forestry—19th Session**. Italy, Rome. ***Contact:*** *www.fao.org/forestry/site/37836/en/page.jsp*

18–20 March 2009. **International forest biosecurity conference 2009**. Rotorua, New Zealand. ***Contact:*** *Margaret Richardson Tel 07 343 5420; margaret.richardson@scionresearch.com*

May 2009 (to be decided). **FAO Advisory Committee on Paper and Wood Products—50th session**. Venue to be decided. ***Contact:*** *Mr. Joachim Lorbach, FAO Forest Products and Industries Division; Joachim.Lorbach@fao.org; www.fao.org/forestry/site/9530/en/*

3 September 2009. **European Forest Institute 2009 annual conference**. Dublin, Ireland. ***Contact:*** *Anu Ruusila, EFI; anu.ruusila@efi.int*

4–5 September 2009. **Forest ecosystem management in the 21st century** (seminar in connection with the EFI annual conference). Dublin, Ireland. ***Contact:*** *John Gilliland; john@ifbsolutions.com*

18–25 October 2009. **XIIIth World Forestry Congress**. Argentina, Buenos Aires. ***Contact:*** *www.wfc2009.org/index_1024.html*