ISSN 1022–5439

ITTO Tropical Forest UPDATE

Volume 22 Number 1 2013

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

Regeneration

Just as tropical forests renew themselves, so has ITTO. On 7 December 2011, the International Tropical Timber Agreement 2006 entered into force, ushering in a new era for ITTO. This issue of the *TFU*, the first to be published after the entry into force of the ITTA 2006, celebrates this new beginning. It highlights examples of the types of work that have helped to make ITTO a leader in the promotion of sustainable tropical forest management and that feature prominently in the objectives of the new agreement.

The ITTA 2006 contains several changes that are likely to lead to significant improvements in ITTO's work. The Organization's longstanding philosophy of using tropical forests in a sustainable way for economic development is stated explicitly in the new agreement. Its two key objectives are to promote:

- the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests; and
- the sustainable management of tropical timber producing forests.

Related to the first objective, the Organization will, among other things, help improve the competitiveness of wood products relative to other materials, boost the marketing of tropical

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Images: Mahogany seedling emerging from forest floor (cover); Mahogany sapling in forest clearing (above). *Photos: J. Grogan*

... Editorial continued

timber from sustainably managed and legally harvested sources, and share information on certification and other aspects of the international timber market.

In pursuit of the second key objective, the Organization will help countries to improve forest law enforcement and governance, address illegal logging and related trade in tropical timber, and undertake sustainable forest management and forest restoration. It will also strengthen the capacity of countries to gather and report data on the tropical timber trade and forest management. The ITTA 2006 also acknowledges the role of ITTO in assisting countries to pursue sustainable development and alleviate poverty and encourages forest-dependent indigenous and local communities to achieve sustainable forest management.

ITTO relies for much of its work on funds contributed on a voluntary basis, up to now mostly by the governments of Japan, Switzerland, the United States, Norway and the European Union. To help boost such contributions the new agreement creates a sub-account for thematic programs, which, some donors say, will lead to increased funding for specific areas of work. The Organization has been implementing four thematic programs on a pilot basis over the past several years, with mixed levels of support from donors. It is hoped that funding for these and new thematic programs will increase under the ITTA 2006.

The ITTA 2006 will help ITTO build on its past sustainable development successes. ITTO believes that natural tropical forests can be both conserved for future generations and put to economic use to alleviate poverty and contribute to national development. The new agreement articulates this belief and gives material support to it through innovative funding mechanisms. While many people think that conservation of tropical forests and the development of the tropical forest products trade are mutually exclusive, each is in fact essential for the other. Without conservation there can be no long-term trade; without trade, the forests will be cleared for agriculture because, one way or another, the people living in tropical countries will continue to demand economic development. ITTO's role has been, and will continue to be, to help governments, companies and communities to improve the management of their forests and the marketing of their products to achieve a sustainable balance between conservation and development.

ITTO and its members will face many challenges in implementing the ITTA 2006. Although membership in the Organization has grown under the new agreement, several key tropical forest countries have yet to complete membership procedures (although most important countries have indicated they intend to join the Organization). Adequate funding for the Organization's work also remains a serious concern: ITTO's Strategic Action Plan for 2013-2018 includes fund mobilization targets of nearly $35 million per year over its 6-year duration to meet the Plan's ambitious goals, four times the average annual voluntary funding to ITTO in recent years. The issue of funding (both multilateral and bilateral development assistance, as well as domestic resources) will be a key determinant of the progress that ITTO and partners can make towards sustainable tropical forest management. The ITTA 2006 will operate for a period of ten years, with the possibility of extensions of up to eight years. The extended duration (more than double that of previous ITTAs) will give the Organization time to work with member countries and other partners to meet these challenges and others that will inevitably arise during the life of the agreement.

This is also a regeneration of sorts for the *TFU*, publication of which ceased during 2012 due to a lack of funding. ITTO is pleased to re-launch its flagship quarterly newsletter with this issue. The *TFU's* future is now guaranteed with funding from the Organization's administrative budget. The editorial team has been strengthened with the inclusion of former editor Alastair Sarre on a consulting basis and ITTO's new Communications and Outreach Officer, Ramon Carrillo. We look forward to working together to inform our readership and the world of the important work being undertaken by ITTO and others to sustain tropical forests.

Steve Johnson
Editor

Taking stock

Meta-evaluation assesses ITTO's project work

By Markku Simula[1], Hosny El-Lakany and Ivan Tomaselli

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Community spirit: Promoting community forest management has been a strength of ITTO (forest nursery in Ghana, PD 49/98 Rev.1 (F)). *Photo: P. Masupa/ITTO*

ITTO has financed over 1000 projects since its establishment. These projects have made a significant contribution to ITTO's objectives both in member countries and internationally. Recently, a stock-taking of progress made through these projects was carried out via a meta-evaluation focusing on 140 projects which had themselves been subject to ex-post evaluation. It revealed strengths and weaknesses in project effectiveness, efficiency, accountability, impacts, and sustainability. It has also generated valuable lessons and good practices to guide the Organization's future project work.

Evaluation is an important instrument for ITTO's accountability and learning. It has generally been practiced in a satisfactory manner but its potential is not fully utilized. Ex-post evaluation has often been perceived more as a formal requirement than a management tool for continual improvement. There are major possibilities to enhance the contribution of evaluations by targeting project selection more strategically, strengthening the systemic links of ex-post evaluation in the project cycle, enhancing dissemination of lessons learned, broadening the pool of expertise, and exploiting various possibilities to improve impacts, sustainability and cost-efficiency.

Methodology

To collect necessary evidence the meta-evaluation team analyzed and rated 92 ex-post evaluated projects. One hundred quality indicators were developed and assessed based on a review of about 500 documents including project documents, progress and monitoring reports, and ex-post evaluation reports. In addition, surveys were carried out among executing agencies, country focal points, evaluators, the ITTO Secretariat staff and selected stakeholders using structured questionnaires. Both the quality of projects and the quality of evaluation and monitoring work were evaluated during the exercise.

The evaluated projects were carried out in 23 countries (there are an additional 13 producing member countries that have implemented or are implementing ITTO projects, but none of their projects has been subject to ex-post evaluation). Only a few of these projects were submitted to ITTO by consuming member countries. Since none of the projects implemented by the ITTO Secretariat (nearly 100 in total) have been subject to ex-post evaluation, these were not included in the meta-evaluation. Due to these caveats and the fact that ex-post evaluations have been carried out only for larger projects, the sample used does not reflect the total portfolio of the Organization's projects.

Quality of ex-post evaluation

The quality of ex-post evaluations has generally been satisfactory but there is variation between evaluators and, to a lesser extent, between ITTO's three technical divisions. As a whole, unsatisfactory evaluations are few. While the outputs of ITTO projects can be generally identified without difficulty, the evaluation of impacts and sustainability is typically constrained by lack of baseline information and quantifiable indicators of measurement. Due to these factors, compounded by limited time and resources available and sometimes over-ambitious terms-of-reference, the quality of the ex-post evaluation process of ITTO projects is often inherently imperfect.

The quality of project design is critical for successful implementation and has an impact on the performance of evaluation. The logical framework matrix included in almost all project documents is a useful tool for good

design but it also has its weaknesses, which continues to represent a problem for many project formulators. Absence of baseline information is a particular problem in field projects involving communities and smallholders, or which are targeted at restoration and rehabilitation of degraded forests. For this reason, pre-project (baseline) and post-project situations are often described only qualitatively. Another related issue is that contributions to ITTO objectives are usually covered by only identifying the existence of the (intended) linkage but qualitative or quantitative analysis of the significance of such contributions is lacking.

Above all, the evaluation quality depends on evaluators. A large majority of them carried out their work satisfactorily and a few proved to be excellent. Only a few evaluators were rated as moderately unsatisfactory and only one case was considered a failure. A significant improvement has taken place in the last 10 years in reporting, judgment and assessment of the key success determinants but there is still scope for improvement and the analysis revealed a number of ways to achieve this.

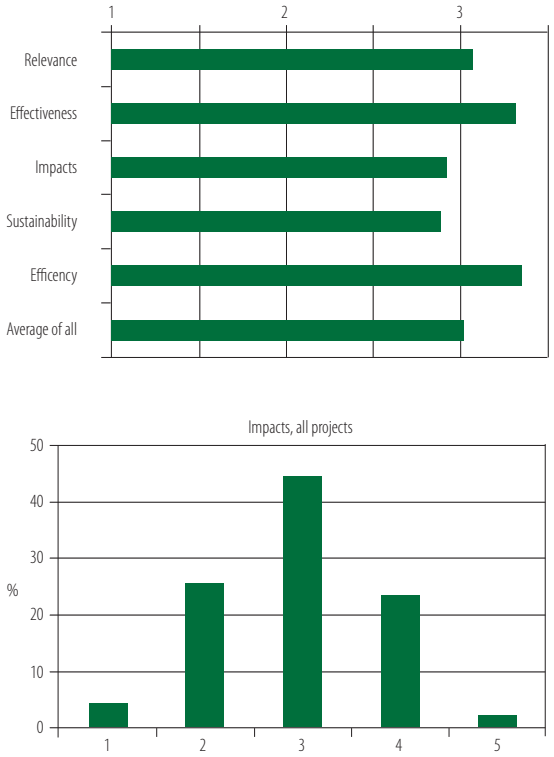
Project quality

It is well known that forestry projects need to address a uniquely complex set of issues. Field projects are often implemented in challenging environments that are largely outside the control of those who fund, implement and benefit from the intervention. Environmental degradation of forest resources, extreme poverty, deficient infrastructure, market access limitations, weak governance, and social conflicts are prevalent in many situations. Field projects can also be affected by external factors such as weather risks. ITTO's projects are fully country-driven and they focus on putting the Organization's policies into action, which adds to their value. However, implementation is subject to changes in the political and institutional environment, which has sometimes been challenging.

In spite of these constraints, the average project quality has been satisfactory (Figure 1). However, averages hide variation between projects, regions and ITTO technical divisions. Effectiveness, efficiency and relevance have received higher quality ratings than impacts and sustainability. Regionally, the sampled projects in Africa have had the highest overall quality ratings in the sample, followed by Asia and Latin America. The international-level projects have suffered from a somewhat lower quality in relevance, effectiveness and sustainability, in spite of their relatively good impacts and efficiency.

As regards relevance in the national or local context, strengths in the project design included alignment with beneficiary/target group needs, implementation arrangements, policy compatibility, economic impact, participation, provision of local opportunities, and partner interest alignment. Somewhat weaker areas have been realism and internal logic in project design but there is

Figure 1. Average project quality and variation of project impacts



Key: 1 = unsatisfactory, 2 = moderately unsatisfactory, 3 = moderately satisfactory, 4 = satisfactory, 5 = excellent

significant scope for improvement also with regard to participation and innovation.

A large majority of the sampled ex-post evaluated projects were rated as satisfactory in terms of effectiveness and several even as excellent, which indicates that the specific objectives were generally well achieved.

Impacts

Impacts were assessed in projects that have been (a) closely targeted at specific substantive, often technically oriented themes to deliver verifiable impacts; and (b) focused on problems in which simultaneous interventions in more than one impact area were necessary; such problems are typical in the producing member countries. In general, the projects have had satisfactory impacts in strengthening of capacity and institutions as well as information and knowledge but lower ratings were found in gender, building up of social capital and empowerment, and economic impact.

The main intended target groups of ITTO projects have been forest administrations, the private sector and forest communities. Training and research institutes as well as NGOs have been targeted to a considerably lesser extent. Successful identification of beneficiary needs has contributed to impacts, particularly in strengthening of social capital and generation of economic benefits. Weaknesses in gender aspects need to be addressed in future projects.

Thematically, the principal impact area has been sustainable forest management (SFM) which is the "core business" of ITTO. Main activities have been forest restoration and rehabilitation, reforestation and plantations, demonstration of new practices, forest inventory, and management planning. Another key impact area has been development of community forest management and enterprise. Other support areas include further processing and industry development, reduced impact logging (RIL), information systems, governance, non-timber forest products, certification and timber tracking, market information and marketing promotion. The balance of project work was not, however, considered fully compatible with ITTO's strategic objectives due to less emphasis on industry development and market promotion.

Among the cross-cutting themes, human resource development has been the focal impact area addressed by most projects. R&D has also been well covered, but there have been fewer projects with impacts in innovation, technology transfer, and little specifically targeted at investment promotion.

Direct project impacts could be considerably enhanced through effective sharing of knowledge. Most project products, lessons learned and recommendations identified are applicable nationally and in more than 20% of the evaluated cases also regionally/internationally. In addition, many projects could be replicated in similar conditions beyond project sites and host countries. This emphasizes the role of ITTO projects as valuable global public goods.

Sustainability

Sustainability has been either satisfactory or moderately satisfactory in most ITTO projects. While technical viability and environmental sustainability were generally rated satisfactory, institutional, economic and particularly social sustainability have been more problematic (Figure 2). Projects have usually a high degree of national policy compatibility which has contributed to sustainability. However, it needs to be emphasized that ITTO projects are all different and cannot contribute to all the sustainability pillars in the same way.

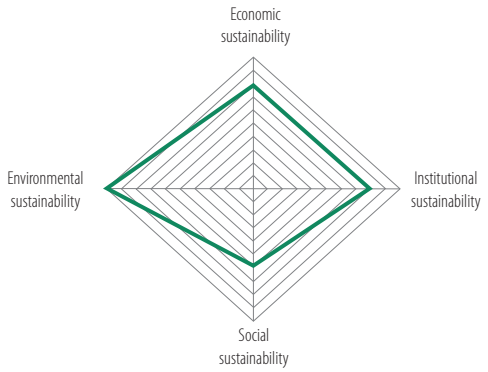
Economic and social sustainability appear to have a strong positive linkage demonstrating the potential for win-win interventions. Positive linkages between economic and environmental sustainability and between social and environmental sustainability were also identified although they appear to be weaker and there are cases with negative trade-offs as well.

Project documents define when the intervention shall be completed but often activities should be continued to have a sustained impact. More than half of all the sampled projects therefore led to design/implementation of a follow-up project or other post-project activities. This suggests that the interventions opened up a new opportunity for future support, or (perhaps more likely) that there was a need to continue to support the started activities to ensure sustainability. However, the lack of post-project financial support often endangers the valuable results in forest protection, community forestry, strengthening of governance, demonstration areas, and many other interventions. This emphasizes the importance of developing adequate exit strategies starting from the project design phase.

Efficiency

The efficiency of ITTO projects has on average been satisfactory as a result of appropriate resource allocation, high cost-efficiency, effective monitoring, and keeping expenditures within the budget limits. However, there is hardly any explicit information on the financial or economic rates of return of the productive activities promoted. This is directly linked with the regular lack of baseline information and inadequate data on benefits and costs representing a major lacuna to be addressed both in project design and evaluation.

Figure 2. Quality of sustainability (all projects) by main pillar



Note: each axis of this chart goes from 2.0 (moderately unsatisfactory) at the center to 4.0 (satisfactory) at the outer vertices.

Many project types funded by ITTO tend to suffer from inherent risks which should be duly considered in project design and implementation. External factors have had a significant negative influence on the implementation of 15% of the evaluated projects. Bureaucratic delays in fund transfer, changes in government policy and institutional responsibilities, and exceptional weather conditions have been quoted as typical examples. However, these have also sometimes been used as an excuse for the delays caused by executing agencies not being able to comply with the obligations of project agreements and implementation rules, or with the agreed work plans.

Contribution to ITTO objectives

Multiple targets are common as most ITTO projects have contributed to the achievement of more than one ITTO objective. Sustainable development (including poverty reduction), improvement of national policies, SFM, and capacity building are typical examples of such multiple objectives. More than 60% of the projects have contributed to consultation for policy development, information sharing, R&D, and access to, and transfer of, technology. Projects which deal with forest land-use and tenure, reforestation, rehabilitation and plantations, industry, markets, and marketing tend to be more focused than in other areas.

On the other hand, while multiple objectives are a positive feature in their own right, they easily increase complexity of the project and can divert attention from the project's strategic focus. In spite of apparent win-win opportunities between ITTO's objectives, these trade-offs need careful consideration in future project design.

Investment in preparatory support has usually resulted in improvement of project quality. Pre-projects have particularly contributed to project staff performance but the impact appears weaker in the other aspects of project quality. On the other hand, a previous project (often a previous phase of the same project) has usually significantly improved overall project performance.

Lessons learned and good practices

Thematic summative evaluation was carried out for 13 thematic areas which are listed below. Valuable lessons and good practices were identified and a separate summary on each theme was included in the meta-evaluation report. These have been made available on the ITTO website to facilitate design, appraisal and implementation of future projects.

Thematic areas

1. Demonstration areas, permanent sample plots and model forests for sustainable forest management
2. Forest inventory, monitoring, mapping and zoning
3. Protected areas/biodiversity
4. Forest restoration, rehabilitation, reforestation and plantations
5. Community forest management and enterprise
6. Illegal logging, governance and forest certification
7. Criteria & Indicators for sustainable forest management
8. Forest information systems
9. Reduced impact logging
10. Further processing and industry efficiency
11. Non-Timber Forest Products
12. Markets, marketing and trade promotion
13. Project design and implementation

Monitoring and evaluation function

Monitoring and evaluation are well-established practices in ITTO with clearly defined procedures and responsibilities. Areas which need to be addressed in the future include (i) choice of projects for evaluation, (ii) use of mid-term evaluation as a proactive management tool, (iii) guidance given to evaluators, (iv) expanding the pool of evaluators, (v) timing of evaluations, (vi) composition of evaluation teams, and (vii) engaging executing agencies in providing management responses to evaluation findings.

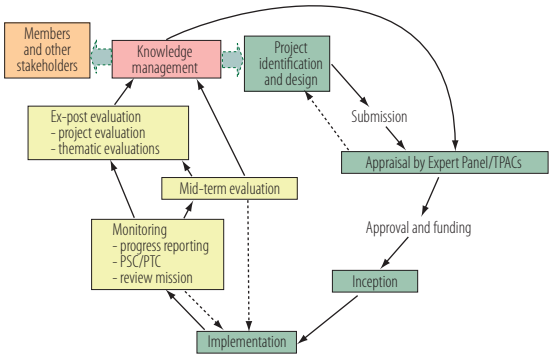
Knowledge management

Effectiveness in learning from evaluation results depends on dissemination and other knowledge management. Few member countries have established mechanisms for sharing knowledge of ex-post evaluation reports. This is obviously a cause of concern, as most of the lessons learned are country specific potentially benefiting national stakeholders.

ITTO needs to strengthen the operational feedback loop from evaluation to project design and implementation through various institutionalized ways for learning. The current dissemination mechanisms are all useful and highly appreciated by stakeholders but need strengthening. Dissemination strategies should be based on diverse needs of various target groups which should also include other stakeholders in all the member countries and beyond. It is critical to allocate sufficient resources to dissemination to capitalize the value of lessons learned from project work.

One of the purposes of ex-post evaluation is to improve the quality of project proposals submitted to the ITTO but the feedback loops have not been strong enough. There should be a requirement for project formulators to look into the lessons learned from previous projects. As a whole, there is a need to establish stronger systemic links between evaluation and the other elements of the project cycle (Figure 3).

Figure 3. Evaluation in the ITTO project cycle



Recommendations

Based on its findings and conclusions, the meta-evaluation made a series of recommendations to strengthen the current monitoring and evaluation function in the ITTO project cycle. These included adjustments in the selection criteria for projects to be evaluated, timing of evaluations, use of mid-term evaluation, selection of consultants, provisions of project agreements, and knowledge management. The Organization should also periodically monitor and report on the performance of its project work through analytical summaries, and expand and strengthen its knowledge sharing mechanisms. The planning, monitoring and evaluation function also needs strengthening in ITTO.

To improve sustainability, executing agencies should plan for adequate exit strategies starting from the project design stage to ensure post-project financial support and firmly commit to implement project recommendations. In addition, country focal points should actively disseminate positive results and lessons learned from ITTO projects within the country to strengthen their impacts.

The full report of the meta-evaluation is available on www.itto.int.

Zoning Mbalmayo

Reconciling conflicting stakeholders in a Cameroonian forest reserve

By: Ongolo Assogoma Symphorien[1], Owona Ndongo Pierre André[2], Béligné Vincent[3], Doumenge Charles[4] and Linjouom Ibrahim[5]

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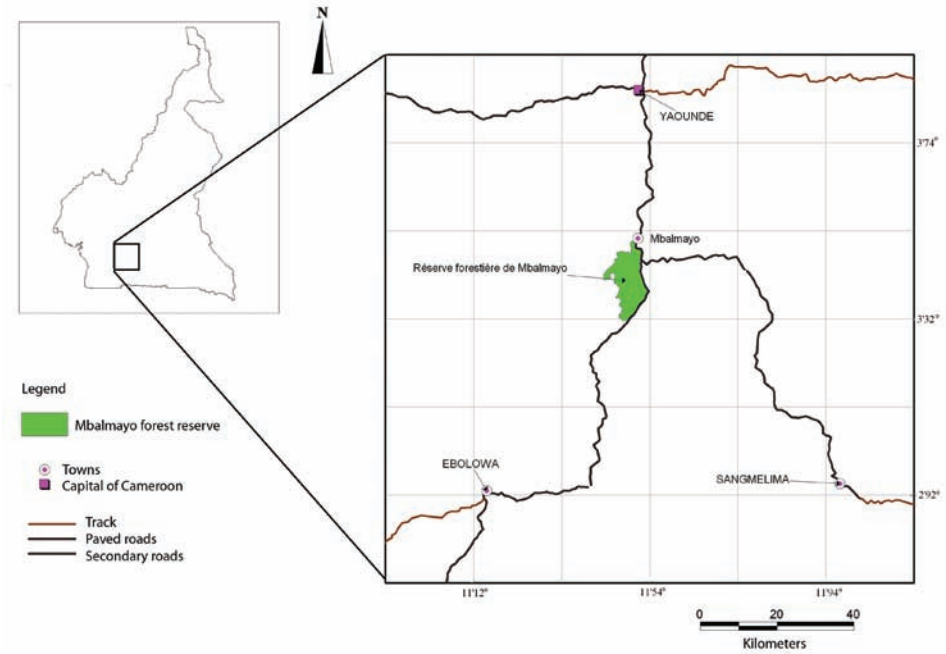


The primary body in charge of forest management in Cameroon is the state, which is responsible for establishing a general policy as well as legislation in the forestry sector, and for granting forest utilization rights. The 1981 existing law on environment management has been revised extensively on two occasions, as a result of which two laws were adopted to establish a new legal framework, first in 1994 regarding forest management, and secondly in 1996, regarding environment management (Cerutti et al. 2008).

The forest sector institutional environment in Cameroon is considered as quite advanced within the Central Africa sub-region, due to the extensive reforms undertaken regarding the forestry regime and the environment during the past fifteen years. In Cameroon, the legal instruments available reflect the commitment of the Government of Cameroon to the principle of a development strategy combining economic and social progress, as well as respect for the environment (FGF and RIDDAC, 2007).

However, recent economic crises have resulted in a reduction of human resources and equipment within the Forestry Administration, which has limited its ability to execute its mandate. This has also contributed to encroachments on forest reserves (illegal logging, clearing for agriculture, etc.), often by neighboring communities.

The Mbalmayo Forest Reserve (MFR) includes on-site research and educational institutions, as well as a forestry training school. Forest zoning and gazetting allowed for the regulation and clarification of a previously chaotic system in which the government operated as if it were the sole owner of the forest. The distribution of forests in protected areas, trading areas and community areas was the first step towards the conservation of forest land, through the introduction of modes of management and other diverse potential uses which vary according to the type of area. Together, zoning and gazetting allowed the stakeholders (authorities, communities, industry, etc.) to determine protected use rights, which had been discarded since the colonial period (Topa et al. 2010).

In developing a sustainable management framework for the MFR, results achieved through previous work (including through ITTO project PD 77/01 Rev.2 (I) and an ITTO fellowship awarded to the lead author) were built upon (Ngodo, 2000; Temgoua, 2007; Owona, 2007; Owona et al. 2008). It was also necessary to negotiate on-site the implementation of zoning proposals, determine the conditions for management transfer and draft terms of reference for agriculture, tourism and science-related uses of the forest in consultation with all the stakeholders involved in the future of the forest (Ongolo, 2008).

Study area

Located in Centre Province of Cameroon, about 50 km from Yaoundé, the MFR was gazetted in 1947 by the French colonial administration. The MFR covers 9700 ha. It is situated at 3.24 degrees latitude north and 11.30 degrees longitude east. It is bound to the west by the Nyong river, to the east by the asphalted Yaoundé-Ebolowa road, and to the south by the So'O river. According to Foahom (1993 in Owona, 2007), the area is characterized by a Guinean bimodal climate with an average annual rainfall of 1600 mm divided into two rainy seasons (March to June and September to November). The average annual temperature is about 23°C and the average relative humidity is 78%. Sunlight reaches around 2000 hours per year. The MFR is located at an altitude of 640 meters on soil with yellow desaturated ferralitic sesquioxides on a bedrock of schist. The natural vegetation in the area is a transition forest

Slash and burn: The MFR is used by locals for subsistence agriculture, timber and other purposes. *Photo: O. Symphorien*

between semi-deciduous forest and closed evergreen forest (Aubreville, 1956).

Originally, the MFR population was made up of the Ewondo sub-ethnic group and of the Beti ethnic group. The vicinity of Mbalmayo industrial city promotes the movement and intermingling of populations of various origins in Cameroon, which utilize the MFR for fulfilling their needs (construction of dwellings, agricultural land, timber, firewood, etc.).

Methodology

The methodology included the use of reference databases to create an overview of the situation in the MFR. Semi-directed interviews and consultation meetings with the various stakeholders were also held to further knowledge on the various uses, needs and involvement capacities of the stakeholders in the MFR. A number of field missions were conducted for updating the existing map database on the basis of new GPS records and for refining survey results.

Results

Land: a critical stake

The rural economy is mainly based on agriculture in Cameroon. Access rights to and use of land are a major issue for the subsistence of rural communities. As Joiris (1998) indicated, in forest areas, villages are surrounded by a dual land zone utilized by communities. The first area is for agricultural use and the second area for forest use. The agriculture area includes fallow lands of short to long duration (from 2-3 years to 10-20 years, and up to 30 years). It also includes regenerated secondary forests which, although they may look abandoned, remain governed by ownership rules, both community and individual, and will be cultivated again some day by the village community. The forest area includes trails and traps whose users are known.

The concept of forest enclave so dear to the MFR neighboring communities originates from what Ngodo (2000) calls "family land". This "family land" (also referred to as "élig") is governed by rights that family members (including the children of unmarried women) hold over land bequeathed by the parents (and that has often been inherited from ancestors).

Stakeholders in the MFR

Several stakeholders from the private sector and institutions interact in the MFR. In addition to the forestry administration in charge of national forestry policy implementation and of the management of the national forests, neighboring communities are estimated to contain 6300 inhabitants distributed among 7 villages. These communities practice subsistence agriculture based on the slash-and-burn system. Urban populations (non-indigenous) living in the area are involved in commercial agriculture (pineapple, tomato crops, etc.). Illegal timber logging, small-scale fishing, hunting and non-timber forest products collection are also major activities within the the communities. Two community groups in the Ébogo enclave also operate ecotourism activities through a project financed by the World Tourism Organization (UNWTO) and the Government of Cameroon.

In addition to neighboring communities, there is also the Mbalmayo National Water and Forest School (ENEF), a public forestry training institution established in the MFR in 1949. ENEF includes a 700 hectare training forest (mainly composed of secondary forest stands and

agricultural fallow land), a dendrological path, a fish-farming pond and a 5.8 hectare arboretum (the only one in Cameroon).

Two research institutes were also established with operations in the MFR: IRAD[1], which originally conducted research on timber species, and IITA[2], which conducted agricultural seed production and enhancement work. WAC[3], in partnership with IRAD, is also conducting domestication and improvement tests for fruit trees and other agro-forestry species.

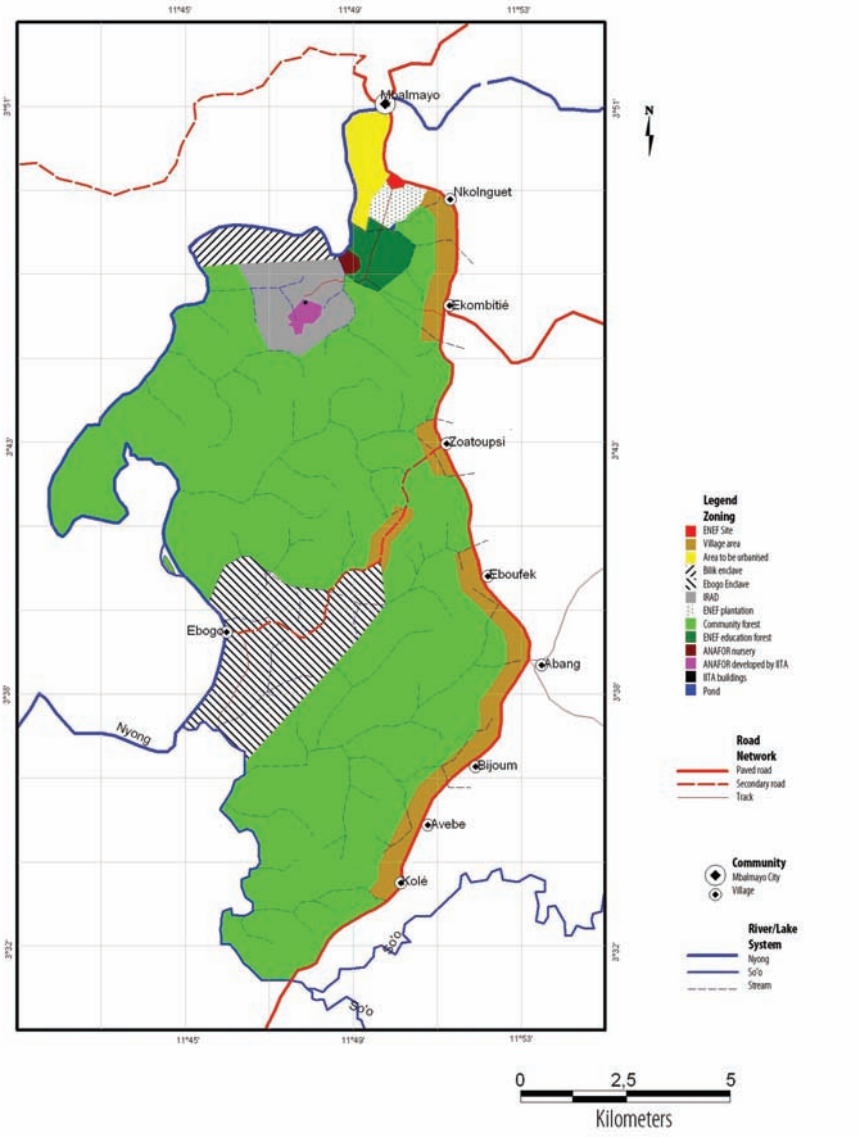
Origin of encroachment

Encroachment by neighboring populations for agricultural and forestry uses was promoted by legal loopholes and contradictory forestry policies prevailing in the Decree creating MFR. The Decree stipulates on the one hand that the MFR is established "*with a view to promote natural reforestation and conduct methodical reforestation work*", whereas it further determines that (i) "*existing cocoa plant plantations which are maintained and healthy will be demarcated and marked out*" and that (ii) "*indigenous populations with custom rights to the land shall be allowed to cultivate subsistence crops within the gazetted forest area*". Such a mix of uses and aims combined with ambiguous interpretations of the forestry law by indigenous populations is one of the reasons for land tenure disputes. The easing of control operations in the MFR by the forestry administration also contributed to increased encroachment.

The agro-forestry techniques long tested in the MFR also contributed to increasing opposition on the part of the local inhabitants. Public research institutions had started preparing the land using bulldozers for the experimental cultivation of fast growing timber species (ayous, fraké, framiré, etc.). The species are considered as "valueless" by the local populations, who consider that they don't justify destroying the natural forest (which provides edible or commercial non-timber forest products such as *Irvingia gabonensis, Gnetum* spp., *Baillonella toxisperma,* etc.) in order to introduce the new species. Feeling increasingly vulnerable, the populations started a race for the control of the land in the MFR. The rights enforcement strategy selected was to establish as many agricultural fields as possible to demarcate "one's property".

Future zoning proposals

The legal framework which governs Cameroon's forestry policy stipulates that regional and local authorities as well as communities may, according to relevant individual mechanisms, benefit from a mandate for the management of the national forest estate. The 2008 decentralization law reaffirms and reinforces some of these mechanisms.



The management policy proposed for the MRF (see map above), was drafted while taking into account the uses, needs, involvement and management capacities of the various stakeholders. For instance, it will be possible to grant management rights to the ENEF with a view to providing the school with a rich and diversified education and research forest, including the arboretum, fish farming pond, and primary and secondary forest stands. It might also be possible to grant a second management mandate to IRAD, including its experimental site and part of the former IITA concession, in order to continue research on timber species and production of agricultural seeds.

The establishment of an agro-forestry zone should be prioritized in the vicinity of villages and/or along roads, according to the number of village inhabitants and the degree of land-use for agriculture. Dwelling construction and the establishment of agricultural activities will be allowed in those areas where agro-forestry practices will be promoted. Declassification of the Northern part of the MFR, already considerably urbanized, will be possible for the benefit of Mbalmayo City. Removing this area from the

1 Institut de recherche agricole pour le développement (Institute of Agricultural Research for Development)
2 International Institute of Tropical Agriculture
3 World Agro-forestry Center

gazetted forest would serve to legitimize and regulate the *de facto* situation.

Finally, it will be possible to grant management rights to Mbalmayo City for 7044 hectares of the MFR. This will enable the development of an ecotourism recreation site in the forest. The proximity of Yaoundé, Cameroon's administrative capital, represents a major advantage for enhancing the site as a suburban forest used for landscape and recreational purposes. The development of community forestry will prove just as beneficial for the supply of legal timber to small-scale industries (furniture and construction) and firewood for Yaoundé. The use of NTFPs for food or medicines will be allowed and regulated through quotas based on productivity in the relevant area. Even though the zoning project development is the result of consultations conducted for three surveys within and in the vicinity of the MFR, it also aims to serve as a technical tool for decision-making. Its aim is to provide a solid base for the final plan of use and ownership rights to be negotiated following an essential phase consisting of the development of maps in participation with all MFR stakeholders. Consequently, it is essential for public authorities to promote a bottom-up approach to the reform process, in order to develop a government management policy for the MFR involving all stakeholders from inception to ensure better ownership of the process. The recommendation is based on the analysis of various development projects which were implemented in the study site. The top-down approach used for the projects was largely responsible for the failure of the top-down development model, since such a concept is far removed from local stakeholders and does not facilitate local ownership of results.

Issues

The legal status for the preservation of protected areas remains meaningless without political support and if management structures are not established in the field (Doumenge, 1998). Even if legal status is in place, due to its ambiguity, and lack of limits and direction, it may be easily bypassed or reinterpreted for the benefit of uncontrolled utilization.

As Pamard and Ramiarantsoa (2008) point out, it is easy to understand how zoning can be a constraint for communities used to considerable freedom regarding the use of space and utilization of resources. In spite of this real disadvantage of zoning, territorial definition does not only entail constraints. It also yields opportunities for some groups to redefine their territories. The link between the development selected and other forms of social and territorial organizations in place highlights distortions in boundaries which shed light on the issues and stakes of the stakeholders.

Risks of sharing-based zoning

Sharing-based zoning will result in the fragmentation of the MFR, followed by the physical demarcation of boundaries. Plots will thereby be allocated to the various stakeholders involved in the MFR for registration. However, such a process could destabilize further the ecosystem which has already been disturbed by anthropogenic activities, since most of the stakeholders aim at shifting to new land use modes (forest conversion to agriculture).

The neighboring communities, convinced they will be deprived of their customary rights in the MFR, seize all opportunities to make land claims when faced with MFR sharing or changes in zoning. Such concerns have been raised at the public information and consultation meetings organized for the communities in which all other institutional stakeholders took part. During the discussions, some village representatives declared that *"If the Mbalmayo Forest Reserve were to be re-zoned, it would be legitimate for local communities (indigenous) to be allocated larger land areas than the 'aliens' (non-indigenous population and other institutions established in the MFR)".* Due to the local communities' concerns, the risk of land-related conflicts is real, as is the threat to social stability, which is already fragile due to underlying land-related tensions.

Social fragility and socio-politic threats

In a cross-analysis on natural resources in relation with the fragilities of forest-rich states in Central Africa, Pourtier (2007, in Châtaigner and Margro, 2007) stated that a study of fragile states should include a review of possible causal links between natural resources utilization and power issues surrounding their control. The author draws on the work of Misser and Vallée who, as early as 1997, showed that in Central Africa, a strong link is observed between resources and conflicts.

Considering the population increase observed in the study site (1.9% natural increase per year), a rapid encroachment on the MFR is to be feared if the area came to lose its gazetted status. The land ownership system in the Beti territory is essentially based on slash-and-burn operations. In addition to the environmental impact, a migratory movement of the populations described as "environmental refugees" by Belhassen et al. (2003) represents a long-term risk. One of the socio-political impacts could be the mass or individual displacement of communities towards still forested areas to satisfy their needs for structural timber, energy timber, non-timber forest products and animal proteins.

Recommendations

Insufficiencies identified in the 1947 colonial decree establishing the Mbalmayo Forest Reserve need urgently to be improved. In this regard, MINFOF should make arrangements for the signature of a new gazetting decree, taking into account the new zoning policy for the MFR, and including the uses, needs and involvement capacities of relevant stakeholders. To ensure synergy of action in the MFR ecosystem, a co-management mechanism ensuring the involvement of all stakeholders should be implemented. It will also be necessary to conduct an inventory of all resources to understand the actual potential of natural resources in the MFR; on the basis of this it will be possible to better determine the objectives of sustainable management.

In order to effectively reduce anthropogenic pressures on forest resources in the MFR, it is crucial to provide an exchange mechanism to ensure

equitable sharing of benefits and to help provide a guarantee for sustainable management. The mechanism could be implemented on the basis of revenue-generating activities through the development of micro-projects.

Conclusion

As Smouts (2001) pointed out, by definition protected areas restrain uses throughout a designated land area. They deprive populations of rights which they consider as theirs, and dismantle traditional systems of space organization and local exchange and management practices.

This analysis shows the need to identify correctly the stakeholders involved in a given area, to know their needs and uses prior to determining the future functions to be allocated to the zone designated to become a protected area. The participative approach selected for the process promotes the commitment of neighboring communities to the project while reducing the risk of socio-political conflicts, which often appear in conservation areas where stakeholders were insufficiently consulted. While there are various causes of encroachment and deforestation in the MFR, slash-and-burn agriculture and illegal timber use remain the main identifiable causes of degradation. Considering the population increase in the vicinity of the MRF, it may be anticipated that the survival of this essentially agricultural population will have an environmental impact whose effect already appears to include forest loss. Cameroon's forestry administration is facing an eternal dilemma, i.e. how to reconcile the socio-economic development of communities living in forest areas while ensuring compliance with national policies for the conservation of natural resources?

The authors wish to thank Koulagna Koutou Dénis and Nankia Hilarion who facilitated the satisfactory conduct of fieldwork. This analysis was also made possible through financing provided by ITTO and the Common Fund for the Forest-Environment Sectoral Program of MINFOF.

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Managing big-leaf mahogany in natural forests

Lessons learned from an ITTO-CITES Programme project

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Timber: Reduced impact logging of mahogany at Acre field site. *Photo: J. Grogan*

The *ITTO–CITES Programme for Implementing CITES Listings of Tropical Tree Species* seeks to ensure that international trade in CITES-listed tropical timber species is consistent with their sustainable management and conservation. Initiated in 2007 with funding from the European Union, the Programme's specific objective is to assist national authorities to meet the scientific, administrative, and legal requirements for managing and regulating trade in important tropical tree species listed in the CITES Appendices such as *Pericopsis elata* (afrormosia) found in Central Africa, *Swietenia macrophylla* (big-leaf mahogany) found in Latin America, and *Gonystylus* spp. (ramin) found in Southeast Asia.

This article summarizes recent findings from a project supported by the ITTO-CITES Programme, "Big-leaf mahogany in the Brazilian Amazon: long-term studies of population dynamics and regeneration ecology towards sustainable forest management". Starting in 2007, this project extended field research initiated in *1995 with support from the US Forest Service's International Institute of Tropical Forestry. The goal is to* establish a biological foundation for sustainable forest management systems for big-leaf mahogany across southern Amazonia based on long-term studies of growth, reproduction, and regeneration by natural populations in primary and logged forests. Detailed understanding of age- and size-related mortality, growth, and reproductive rates is essential for evaluating current management guidelines and adapting management practices to changing environmental and socio-economic contexts across this vast region. This study's mahogany populations are the longest and most intensively studied populations in Amazonia.

Four research sites in southeastern Pará and the western state of Acre are visited annually or bi-annually during the dry season to re-census nearly 700 mahogany trees larger than 10 cm diameter mapped in approximately 4000 hectares of forest. Seedling performance in natural and artificial gaps in experiments initiated during 1996-1997 are also monitored, as are enrichment plantings in logging gaps opened during a 2002 reduced-impact harvest at the Acre site. These data help to explain the conditions fostering survival and growth of mahogany during all phases of its life cycle, the dynamics of natural populations, and potential recovery rates by logged populations. Principal findings from research undertaken to date are summarized in the following sections.

Historic range and current commercial stocks in South America

The controversy over mahogany's proposed listing on CITES Appendix II during the 1990s was fueled by disagreement and confusion over its commercial and conservation status. In a technical report (Martinez et al. 2008) and published article in the journal *Conservation Letters* (Grogan et al. 2010), we revised Lamb's (1966) historic range map for mahogany in South America and estimated the extent to which commercial stocks had been depleted as of 2001. Using a combination of satellite data, expert surveys, and sawmill processing data from Brazil, we estimate an historic range of 278 million hectares spanning Venezuela to Bolivia, 57% of this in Brazil alone. We found that Lamb overestimated mahogany's range in South America by almost 20%. Of the revised historic range, 21% had been lost to forest conversion by 2001, while mahogany had been logged from at least 45% of

the remaining forested area, leaving approximately 34% of the historic range with commercial stocks. However, after several decades of intensive logging leading up to the Appendix II listing in 2002, most surviving stocks in Brazil, Peru, and Bolivia were extremely low-density populations in remote regions representing a smaller fraction of historic stocks than expected based on estimated current commercial range. The fact that these are low-density populations has important implications for sustainable management.

Impacts of logging on populations and prospects for second harvests

The sustainability of current management practices can be assessed by quantifying pre-logging population densities and projecting growth and survival by post-logging populations during intervals between harvests. In an article published in *Forest Ecology and Management* (Grogan et al. 2008), we report higher historical landscape-scale mahogany densities in southeastern Amazonia compared to southwestern Amazonia, where most remaining commercial stocks survive. From 100%-area inventories covering 200 to over 11 000 hectares, densities of trees larger than 20 cm diameter varied by two orders of magnitude and peaked at 1.17 per hectare. Using growth and mortality data from this project's principal field site, we project population recovery over the current legally mandated cutting cycle of 30 years. At seven out of eight sites, populations exceeded 20% retention densities by a range of 0 – 31%. Only at one site where sub-commercial trees dominated the population was the recovery of harvestable stems projected to exceed initial commercial densities. These results indicate that the currently allowable 80% harvest intensity will not be sustainable over multiple cutting cycles for most populations without silvicultural interventions ensuring establishment and long-term growth of artificial regeneration, including repeated tending of out-planted seedlings.

Impacts of logging on genetic structure

Whether logging negatively impacts genetic structures of natural mahogany populations has long been a controversial topic. In a collaboration with researchers from the Instituto Nacional de Pesquisas da Amazônia (INPA) published in *Forest Ecology and Management* (André et al. 2008), we assisted an investigation into the effects of selective logging on genetic diversity of the mahogany population at our principal research site in southeastern Amazonia. Comparing microsatellite loci in individuals from the pre-logging cohort (trees that survived logging) vs. the post-logging cohort (seedlings establishing after logging), a significant reduction in the number of alleles, observed heterozygosity, and distinct multilocus genotype number was found in the seedling (post-logging) cohort. This loss of genetic diversity likely occurred due to a reduction in effective population size as a consequence of logging, which leads to the loss of alleles and limits mating possibilities. These results raise concerns about the conservation genetics of logged mahogany populations where a high proportion of adults are removed from the system.

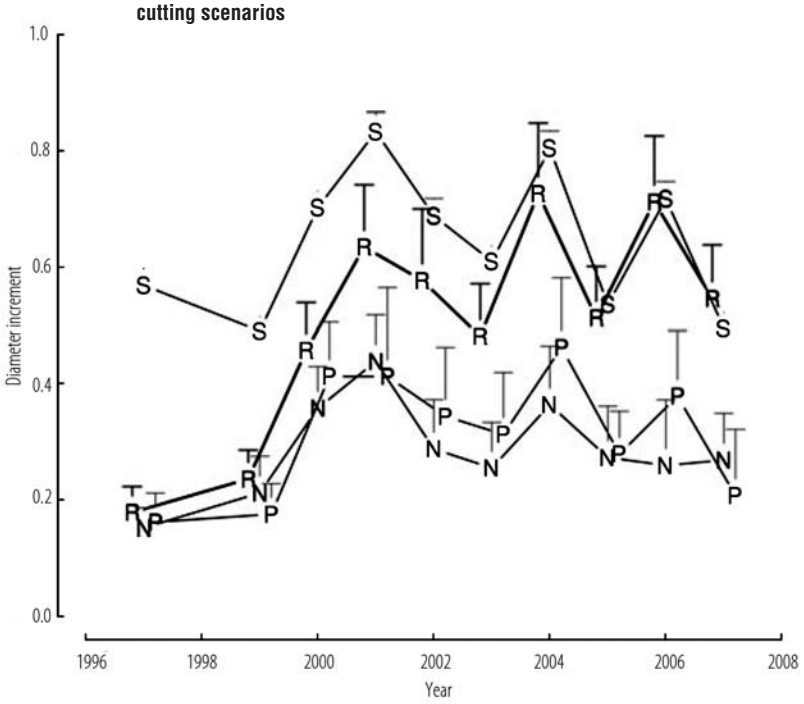
Impacts of crown vine coverage and vine cutting on survival and growth

While vines covering tree crowns have been implicated in reduced growth and fruit production rates by tropical tree species, we published the first experimental test of this dynamic in the *Journal of Applied Ecology* (Grogan and Landis 2009), comparing growth and fruit production rates by trees before and after vine cutting (previous studies have simply compared growth by trees with vines vs. trees without). Long-term monitoring and annual censuses at the Marajoara field site in southeast Pará made this possible, allowing comparison of performance by heavily infested trees during the period 1995–1998 vs. performance after vine cutting during the period 1998–2007. While vine cutting did accelerate growth and fruit production by previously moribund trees, five or more years passed before performance by 'released' trees matched that of trees without history of vine coverage (Figure 1). The message for forest managers is that targeted silvicultural practices such as vine cutting can reduce mortality during intervals between harvests and increase long-term growth and timber yield. Financial returns from vine cutting are likely to be higher than silvicultural treatments such as liberation thinning to reduce crown competition from neighboring trees because the effect – elimination of vines – is more persistent.

Mahogany population dynamics

Planned forest management requires basic understanding of the factors influencing tree survival, stem diameter growth rates (and by extension, commercial volume production), and seed production. Thirteen years (1995–2008) of annual censuses of large numbers of mahogany trees at multiple field sites enabled us to estimate the relative contributions of several readily observable tree-level factors to long-term survival and growth in an article published in the *Journal of Applied Ecology* (Grogan and Landis 2009). The best predictor of future survival and diameter growth rates turns out to be current growth rate – that is, trees that grew fast during the previous year or years are the ones most likely to survive the longest, and to grow the fastest during intervals between harvests. While this result may seem intuitively obvious, it confirms reports from other regions for other timber species and suggests an extremely useful management tool for forest managers faced with decisions about seed tree retention (in Brazil, 20% of commercial-sized trees must be retained for seed production between harvests). A single year of diameter growth measurements of both

Figure 1. Annual diameter growth (cm) of mahogany trees under different vine cutting scenarios



Note: Trees released from heavy vine loads (R) accelerated growth rates until they grew as fast as trees without vines (S, sample population) but partially released (P) and unreleased (N) trees did not.

commercial and sub-commercial trees before the first harvest could indicate which trees are growing fastest and therefore have the highest potential for survival and fruit production between harvests. All things being equal, these are the trees that should be retained under the 20% rule, because these are the trees that will maximize commercial volume and seed production during the interval before the second harvest in 25–30 years. This study also showed that after recent growth rate, crown vine load is the strongest predictor of growth and survival. This outcome further reinforces the importance of vine removal as a management tool with potentially strong benefits.

Enrichment planting after logging

With colleagues from this project's facilitating agency, the Instituto Floresta Tropical (IFT) based in Belém, Pará, a study of seedling enrichment planting in artificial gaps opened in liana-dominated forests after logging was published in the journal *Forest Ecology and Management* (Keefe et al. 2009). While mahogany growth performance lagged behind that of other fast-growing native timber species (e.g. *Ceiba*, *Schizolobium*, *Parkia* spp.), survival and growth by mahogany seedlings over the eight-year study period was nevertheless excellent, with a mean diameter of ~10 cm attained (pole size).

Seedling regeneration in the forest understory

Across southern Amazonia, larval caterpillars of the nocturnal moth *Steniscadia poliophaea* defoliate and kill newly germinated mahogany seedlings in natural forests, representing a serious potential management issue. Studies carried out under the project found conclusive evidence that widely cited but rarely substantiated distance- and density-dependent seedling mortality occurs in mahogany regeneration. This finding, published in the journal *Oecologia* (Norghauer et al. 2010) and summarized in a recent book chapter (Norghauer and Grogan 2012), means that adult *Steniscadia* moths target adult mahogany trees in their search for germinating seedlings to serve as hosts for eggs and larval caterpillars. Seedlings establishing close to adult trees – and most seeds germinate within 35 m of adult trees due to limited wind-aided dispersal distance – suffer higher mortality due to *Steniscadia* predation than seedlings germinating far away, an 'escape clause' in mahogany's complex life cycle. This simple answer to one of tropical ecology's most influential theories (the Janzen-Connell hypothesis) has extremely important management implications. It tells us why some seedling regeneration has a greater likelihood of survival and growth than other seedling regeneration, and where forest managers should actively promote establishment and growth of natural regeneration: further from adult trees is better than closer, all things being equal.

Growth and fruit production by isolated trees in open growing conditions

In the Brazilian Amazon, big-leaf mahogany trees are often retained in agricultural fields and pastures for seed and timber production after selective logging and forest clearing. In a study published in the journal *New Forests* (Grogan et al. 2010), we monitored annual survival, stem diameter growth, fruit production, and date of dry season flowering initiation during 1997–2003 by trees growing scattered across a large open clearing after forest removal compared to trees growing in heavily disturbed forest after selective logging and canopy thinning. Trees in the open clearing died at faster rates, grew more slowly, produced fewer fruit, and initiated flowering earlier, on average, than trees in logged and thinned forest during this period. The principal cause of mortality and stem damage in both environments was dry season ground fires. Mahogany trees in logged and thinned forest at the study site grew faster than mahogany trees at a selectively logged but otherwise undisturbed closed-canopy forest site in this region during the same period. This was likely due to vine elimination by ground fires, increased crown exposure after canopy thinning, and soil nutrient inputs due to ground fires. Without effective regulation and control of anthropogenic fires, attempts to manage remnant mahogany trees for future timber yields or to restore commercially viable populations in seasonally dry southern Amazonia may prove futile.

Management challenges associated with single species production from mixed-species forests

Management of highly diverse mixed-species forests is particularly difficult when only one tree species produces the majority of high-value timber. In a paper published in the *Journal of Sustainable Forestry* (Kelty et al. 2011), current and past forest management practices in two regions with these characteristics are examined: Massachusetts, USA, where red oak (*Quercus rubra*) is the key timber species, and Quintana Roo, México, where big-leaf mahogany is by far the most valuable species. These regions have different ecological characteristics, forest ownership types, landowner income, and importance of timber in total income, yet the silvicultural approach (low-intensity selective logging) is similar, and generally fails to provide the conditions needed for regeneration and growth of the focal timber species. In both situations, the reluctance to harvest low-value species and interest in minimizing forest disturbance complicates management. Successfully balancing timber harvests and forest conservation may prevent conversion of these lands to agriculture or residential development, but socio-economic conditions (property tax policies and landowner affluence) play an important role in the outcome.

Management challenges associated with ecologically 'rare' timber species

Like mahogany, most high-value timber species in the Amazon occur at extremely low landscape-scale densities, that is, fewer than one tree larger than 20 cm diameter per hectare even where commonly occurring. Articles in the journals *Forest Ecology and Management* and *Biological Conservation* (Schulze et al. 2008a, 2008b) examined management issues raised by intensive harvesting of these species. Based on long-term survival and growth data for seven timber species, including species under study at our principal research site since 1997, we asked: Under current Brazilian forest legislation, what are the prospects for second harvests on 30-year cutting cycles given observed population structures, growth, and mortality rates?

Our data indicates that the most important determinant of recovery and future harvest levels is pre-harvest stocking levels of sub-commercial stems. Simulation models demonstrate that reducing species-level harvest intensity by increasing minimum felling diameters or increasing seed tree retention levels improves prospects for second harvests of those populations with a relatively high proportion of sub-commercial stems, but does not dramatically improve projections for populations with relatively flat diameter distributions (that is, poor representation by sub-commercial stems). It turns out that restrictions on logging timber tree populations occurring at very low densities, such as the current Brazilian 10% retention rate for non-mahogany species, provide inadequate minimum protection for vulnerable species. Population declines, even if reduced-impact logging (RIL) is eventually adopted uniformly, can be anticipated for a large pool of high-value timber species unless harvest intensities are adapted to timber species population ecology, and silvicultural treatments are adopted to remedy poor natural stocking in logged stands.

Summary and recommendations

Our annual return to research sites in southeast Pará ensures the continued survival of threatened mahogany populations. These populations survive in isolated patches of logged forest on a regional landscape where most natural forests have been converted to pasture and agricultural uses. In fact, within this larger region, where Brazil's richest mahogany stands occurred before logging began in the early 1970s, commercial stands have been almost completely extirpated. Natural populations comparable to those under study in this research program simply do not exist elsewhere in this region.

From our on-going research on mahogany in southern Amazonia, it is clear that minimum steps towards managing and restoring mahogany populations across the species' historic range in southern Amazonia will require:

- **Managing population structures**: In populations with few sub-commercial trees, the 20% retention rate will lead to sharply reduced volume production during second and third harvests on 25- to 30-year cutting cycles.
- **Choosing remnant (seed) trees:** All things being equal, the fastest-growing trees during the year or years before the first harvest should be retained to maximize volume recovery and seed production during the interval before the second harvest.
- **Thorough vine cutting** with follow-up after one or two years is the most cost-effective silvicultural treatment available for improving long-term timber and seed production by remnant trees.
- **Enrichment planting** in logging gaps can be cost-effective and is essential for maintaining timber yields during third harvests and beyond.
- **Genetic structure:** Further studies are needed to evaluate whether the 20% retention rate in Brazil is sufficient to avoid negative impacts on genetic structure observed under higher harvest intensities (10% retention or less.)

Copies of all papers/journal articles referred to are available from the first author.

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Nature's barcode: the simplest way to track wood

DNA fingerprinting becomes a viable option for verifying existing wood-tracking systems

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Stockpiled DNA: Sampled logs await loading onto a barge. *Photo: A. Suchayo, DoubleHelix*

Using the genetic data inherent in wood DNA as a natural barcode has long been proposed as an elegant and simple way to track wood products through the supply chain. Until recently, however, such an approach has been considered too costly and complicated, the primary barrier being the expense of setting up a comprehensive genetic database. This paper describes a DNA 'fingerprinting' methodology that does not rely on the establishment of a genetic database. It could be the holy grail of wood-tracking.

Wood-tracking systems

A necessary requirement of all certification and legality verification systems is a system to track wood from the forest source to export, with the aim of guaranteeing that wood and wood products are derived from legal and sustainable sources and that wood derived from unknown and illegal sources is excluded. Any wood-tracking system should also enable independent monitoring to assure all interested parties that the system is working as planned and is credible (Anon. 2007).

The DNA methodology described here is based on physically matching samples taken from the same log at different stages of the supply chain in conjunction with existing paper-based chain-of-custody (CoC) documentation. A relatively simple DNA fingerprinting test is used to confirm whether the samples originate from the same log, validating or invalidating the CoC documentation.

Why DNA fingerprinting?

Two significant changes have taken place to unlock the potential of DNA for wood-tracking: one in thinking and the other in technology. Early thinking held that DNA tracking would require a comprehensive genetic database of any target tree population, but no such databases existed. It was concluded, therefore, that DNA fingerprinting was unlikely to be a solution for wood-tracking, although in the future it might be used to establish the origin of suspected illegally harvested logs (Dykstra et al. 2003).

New thinking, however, envisages tracking based on the matching of samples of individual trees (Lawson 2007), which would not require an existing genetic database. This concept is similar to a human paternity test, in which DNA samples taken from two individuals are tested against each other to see if they match. Participants in paternity tests do not require their DNA profile to be included in a pre-existing database.

The technological breakthrough comes courtesy of the Human Genome Project, which was completed in 2003. The drive to sequence the human genome was akin to the space race of the 1960s - it fuelled huge advances in technology and genetic sequencing know-how. It took the Human Genome project 13 years and US$3 billion to sequence a human genome. To indicate the resultant advances that have been made in genetic sequencing, in 2012 the cost of sequencing a human genome was about US$6000 (Wetterstrand 2013). Thus, the cost and ease of extracting, sequencing and matching DNA (i.e. DNA fingerprinting) are such that DNA wood-tracking is now a commercially viable option.

A 21st century approach to chain of custody

The genetic matching of individual logs along a supply chain supports, rather than replaces, existing paper-based methods of wood traceability. DNA analysis can be used to validate existing CoC documentation, which is acknowledged to be vulnerable to falsification - particularly between the logging concession and the mill, where most illegally logged wood is introduced into the supply chain (Zahnen 2008).

In 2009, ITTO supported a project through its Biannual Work Programme to evaluate the scientific viability of integrating DNA wood-tracking with an existing CoC system. The project was conducted on a merbau (*Intsia* spp.) supply chain, with logs harvested in Papua, Indonesia, and transported to a mill in Java for processing into flooring and decking. The project demonstrated reliable and accurate differentiation between individual trees (and the logs derived from those trees) and showed it was possible to validate (or otherwise) the transportation documentation from concession to mill. The results of this project are reported in detail in Lowe et al. (2010) and summarized below.

Methodology

Forest concession samples were taken from 2627 merbau logs from particular batches (barge-loads) of raw wood, at either a primary log pond or the point of loading, between 14 November 2009 and 11 March 2010. Samples were referenced to painted markings on the logs indicating the log number, the petak (the harvesting area), the species and dimensions, and the year of the cutting licence under which the tree was felled. Logs were then loaded onto a barge, shipped to Java and transported by truck to the mill. This process was tracked with standard Indonesian government paperwork known as SKSKB transport documents and associated log lists.

At the mill, a second set of samples was taken from 741 logs and again referenced against the painted log markings showing log and petak numbers. Concession and mill samples were collected following strict quality-control protocols designed to maintain the freshness of wood samples by minimizing the loss of moisture content and thus preserving the DNA stored in the sample.

Following guidelines of the International Organization for Standardization (ISO) for sampling procedures for quality-control inspection (ISO 2859), 32 samples were chosen randomly from the samples collected at the mill and matched with the samples collected from the concession using the SKSKB log transport documentation and log lists. The sample pairs were forwarded to a laboratory, where DNA was extracted and used to amplify 14 genetic markers (one chloroplast microsatellite and 13 nuclear microsatellites). For each of these markers, the success of DNA extraction and amplification was recorded for both samples of each of the 32 logs. Population allele frequencies were used to calculate the probability that an individual genotype (or genetic profile) occurred within the logging concession (Lowe et al. 2004); this was done as an additional check on the possibility that logs had been substituted along the supply chain.

Results

The study found that while the ability to extract and analyse DNA from logs decreased slightly between the forest concession and sawmill samples, overall sufficient data were obtained for 27 of the 32 logs to provide exact genotype matches between forest and sawmill samples. For four of the five samples that failed, the sawmill sample failed to amplify any microsatellite loci; for the fifth sample, non-overlapping genetic markers were amplified between the forest and sawmill samples, making it impossible to determine whether the samples matched.

Of the 27 samples for which the forest and mill DNA genotypes matched, it was possible to calculate the probability of an identical genotype being present within the forest concession, providing a test of the likelihood that an illegally substituted log would have the same genotype as the forest sample. The probability of illegal substitution was very low (1 in 100 000 or lower) for 18 samples, low (1 in 100 to 1 in 10 000) for 7 samples, and moderate (1 in 10) for 2 samples (see table following page).

Towards a more practical approach

Clean-slate approaches

Most technologies for tracking wood on the market aim to replace existing government-regulated marking and paperwork systems entirely in a 'clean-slate' approach, on the basis that most existing government systems are insufficiently robust and are open to abuse. There are problems with the clean-slate approach, however. Starting from scratch makes new systems slow to implement, while the need to use advanced technologies to overcome fraud makes them more expensive than the traditional government controls they replace. Perhaps more importantly, a clean-slate approach is short-sighted because it fails to support efforts to improve official controls by simply bypassing them. While a clean-slate approach allows progressive individual concessions – such as those with strong links with sensitive markets – to establish their own systems on a voluntary basis, it does little to counter the broader problem of illegal logging. Ideally, similar robust and advanced technologies would be taken up nationally by governments, but this requires a rare willingness to consider radical change and the capacity to pay for it, which is also often lacking.

Results of DNA fingerprinting on 32 randomly selected merbau logs harvested in Papua, Indonesia, and transported to a mill in Java for processing

Log	No. of loci matched[a]	% confidence no log substitution[b]	Verdict
1	6	99.99995	Match
2	4	99.998	Match
3	6	99.999999999	Match
4	4	99.999	Match
5	4	99.9998	Match
6	3	99.99998	Match
7	12	100	Match
8	10	100	Match
9	0	0	No result
10	4	99.9999	Match
11	12	100	Match
12	4	99.9999	Match
13	3	99.9	Match
14	3	99.99	Match
15	1	99	Match
16	1	67	Moderate chance of substitution
17	4	99.998	Match
18	4	99.995	Match
19	10	99.999999997	Match
20	5	99.98	Match
21	5	99.9999999996	Match
22	1	96	Low chance of substitution
23	4	99.994	Match
24	4	99.97	Match
25	0	0	No result
26	1	99	Low chance of substitution
27	1	89	Moderate chance of substitution
28	4	99.998	Match
29	0	0	No result
30	3	99.98	Match
31	0	0%	No result
32	0	0%	No result

Note: a = the number of loci (genetic markers) that amplified and matched from both forest and mill samples; b = the resulting confidence level that another log with the same genetic profile was not substituted. For example, for log 1 there is 99.99995% confidence that there was no log substitution between concession and mill and that the CoC was intact.

Incremental approaches with high-tech checking

An alternative to the clean-slate approach is to support existing systems with technologies that can double-check the veracity of those systems and to build on them incrementally. This approach has the advantage of being quick and cheap, and it is more likely to be viable for national uptake. It also supports rather than sidelines government efforts to tackle illegal logging.

A DNA-based system is ideal for this kind of incremental approach. DNA match-sampling can be carried out at given stages of the supply chain and used to cross-check the veracity of painted markings and paper-based CoC systems. Such systems may remain susceptible to fraud, but DNA-matching technology would catch enough fraudsters to make cheating uneconomic.

There are benefits in terms of cost as well. Other technological solutions for tracking wood must cover every stage of the supply chain and are only as strong as their weakest link. In a supply chain verified using DNA, however, only the beginning and end of the chain need be secured. Basic paper-based (or, in some places, computer-based) systems would still be needed for matching samples with their source logs, but the incentive to abuse such systems would be removed by the risk of exposure by DNA matching. This would reduce the burden on independent auditors or verifiers by removing the need to examine the intermediate stages of the supply chain (Lawson 2007).

An incremental approach using existing systems combined with DNA matching can complement and even replace audits conducted in person at critical points in the supply chain. By relying more on scientific data, it may be possible to reduce the overall cost of certified wood products and to reduce the cost burden of monitoring the supply chain, making certified products cheaper. A comprehensive cost–benefit assessment of the various wood-tracking options is recommended to enable comparisons, assess the cost-effectiveness of certification with and without DNA testing, and evaluate the most efficient combination of DNA testing and physical auditing.

If the cost-savings associated with a reduced need for auditing outweigh the costs of DNA testing, the cost of maintaining a DNA–CoC system will be less than a traditional paper-based and audited system. With the increasingly low cost of DNA testing, this is a probable outcome.

An incremental approach using existing systems combined with DNA testing can also be integrated into the legality assurance systems (LASs) being developed by countries participating in the European Union Forest Law Enforcement, Governance and Trade (FLEGT) voluntary partnership agreements (VPAs). It is likely that LASs will involve improvements and additions to existing government systems. DNA could be used either as part of a standard in-country verification process, or jointly by the European Union and source-country governments as an enforcement and verification tool.

Implementation

The ITTO project described above provides pointers for further development. To test the methodology on a small scale, the project was implemented using specific batches of wood and therefore on only a limited part of the supply chain. Samples were taken at the primary log pond rather than the point of harvest - it is at the log pond where the buyers of raw wood are decided and the final destinations of the logs determined. A next step would be to apply this methodology to an area-based certification system where samples are taken by the concessionaire at the point of harvest or during the forest inventory. Sampling would also extend further along the supply chain through processing

to the finished product, with a focus on the links in the chain that are most at risk from log or lot swapping.

The scientific validity of the methodology has been demonstrated. Further improvements can be made to the DNA extraction protocols to improve the reliability and quality of DNA extraction to obtain an even higher success rate. This would reduce the need to repeat tests and would further reduce the cost of the testing process.

At the far end of the supply chain, the methodology is currently limited to solid wood products such as flooring, decking and furniture, where the extent of processing (heat and chemical treatment) and therefore the impact on the wood's DNA is relatively low. Improvements to DNA extraction protocols may enable the application of the technology to further-processed products such as plywood.

DNA testing is not designed to replace existing paper-based systems; rather, it is designed to support, simplify and strengthen them. Genetic mismatches highlighted by DNA testing can act as a 'red flag' to auditors, who can then conduct more thorough investigations. We believe that this DNA tracking methodology is now suitable for industry uptake to track certified wood and check for illegal substitutions along solid-wood-product supply chains. The methodology will not only complement paper-based CoC methods, it will contribute to future methods that use databases on genetic structure (e.g. Deguilloux et al. 2003; Lowe et al. 2004; Lowe 2008; Lemes et al. 2010).

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Managing big-leaf mahogany in natural forests (continued from page 15)

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PNG's changing paradigm

An ITTO project has helped develop a new SFM model in Papua New Guinea

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Protected: Forest in the Adelbert Ranges under a community-based land-use management plan/conservation agreement. *Photo: D. Gilmour*

For the past 30 years, forest management in Papua New Guinea (PNG) has been dominated by an industrial model under which:

- a forest management agreement is negotiated between the state, landowners and industry (providing a mechanism whereby landowners transfer forest management rights to the state, which is supposed to manage forests sustainably on behalf of the landowners); and
- landowners receive a guaranteed portion of royalty payments.

Widespread dissatisfaction with this model has emerged over the years, due primarily to unacceptable levels of destruction and degradation of large areas of forest, which landowners value for a wide range of goods and services and the inequitable sharing of benefits from commercial exploitation of forests.

Industrial forestry has now come to an end in several provinces in PNG and is declining rapidly in several others. By and large, the easily accessible forests have been harvested. Data from the PNG Forest Authority indicate that 75% of concessions under forest management agreements have concluded their operations. Clearly, an alternative model for forest management is urgently needed to address the deficiencies of past approaches and to commence planning for the future.

A new model for PNG forests

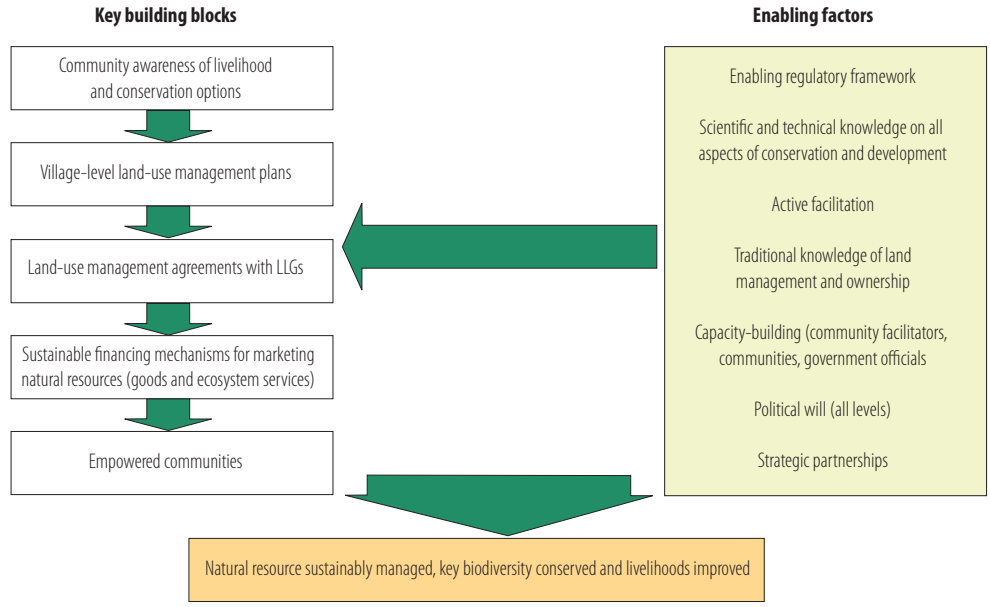
An ITTO project[1] that operated between 2006 and 2010 has developed an alternative approach that could point the way for the future of sustainable forest management in the country. The project was executed by the PNG Forest Authority and implemented by The Nature Conservancy (TNC). It operated in the Adelbert Ranges in the Almami Local Level Government (LLG) area of Madang Province on the north coast of PNG. The Nature Conservancy has been working with local government and communities in the Madang area to protect biodiversity since 1997, and the ITTO project built on that previous work. Partly as a result of the earlier collaboration, the Almami LLG enacted an Environment and Conservation Law, the first of its kind in PNG, in 2003. This law created an enabling regulatory framework for the development of community-based land-use management plans and conservation agreements to empower local landowners to manage their natural resources for their own benefit. Under the law, clans retain ownership of their land. Moreover, the process does not involve or encourage either land registration or clan incorporation, which many clans fear because they can be precursors to losing control of their land.

The ITTO project was designed, in effect, to operationalize the 2003 Almami LLG Environment and Conservation Law. However, there was also a broader consideration, because the problems of forest degradation and inequity associated with the prevailing forest management paradigm applied not just to the project site in the Adelbert Ranges but also to much of the rest of the country. Hence, the project was perceived to have national application, and its stated aim was "...to create a conservation and development model that can be applied widely throughout the country".

The results of the project greatly exceeded expectations. Nine of the 22 villages in the Almami LLG completed

1 PD 324/04 Rev.3 (F)

A generic model of community-based natural resource management for use by communities in PNG



Source: developed during a project team brainstorming session on 16 May 2012.

land-use management plans and signed conservation agreements covering 18 000 hectares, including 4360 hectares of core conservation areas.[2] The approach is now being replicated in the provinces of West New Britain and Manus.

The approach trialled by the project placed high prominence on conservation objectives and was referred to as a 'conservation–development' model. The model was designed to encourage the community-based sustainable management of all natural resources, with a conservation underpinning. In an ex-post evaluation of the project in mid-2012, the approach developed by the project was analyzed and represented in a modular format so that the model's key building blocks could be readily visualized and communicated. The model was also reformulated slightly to be more generic so that it could be applied to a wide range of situations encountered in natural resource management in PNG, including sustainable forest management and sustainable fisheries management. Conservation agreements are replaced by land-use management agreements, which encompass a broader range of objectives, although the conservation underpinnings of the original approach can still be integrated readily into the revised model. The flowchart above shows the key building blocks of the model.

Conclusion

The experiences of Almami communities since 1996 and the outcomes of the focused support provided by the ITTO project between 2006 and 2010 could be the first chapter in a book to be written on a new paradigm for managing natural resources in PNG by empowering local communities. This vision for the future is one in which local communities are empowered to develop their own land-use plans and manage their own natural resources - including forests - for their own benefit, with support and facilitation by government and other organizations. However, there are several major challenges to be faced in mainstreaming such an approach. The two most critical of these are:

- building capacity for the community facilitation that is essential for empowering communities to carry out participatory land-use planning and negotiate land-use management agreements with LLGs; and
- ensuring that communities can obtain sufficient financial benefits from the sustainable use of their natural resources (goods and ecosystem services) to make their involvement in the process worthwhile.

While future prospects for adopting and mainstreaming a new approach to the management of natural resources in PNG are bright, there is a danger of stagnation and even reversal unless pressure is maintained by government and others to continue developing and implementing the process. In this regard, political will and the role of champions, many of whom have emerged in PNG in the last few years, will be critical for maintaining the momentum for change.

2 Three of the conservation agreements were signed before the commencement of the project.

Fellowship report

Timber concessions in Peru: a case study of the management capacity of SMFEs

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Floaters: There was less investment in roads among SMFEs in Manu and Tambopata which had water access to their forest concessions.
Photo: R. Cossío

Madre de Dios is one of the few mega-diverse zones in the world, which possesses some of the last intact commercial populations of *Swietenia macrophylla* (big leaf mahogany). This region, which is the third largest producer of timber in Peru, has been suffering from severe forest degradation for the past several years, due in large part to illegal logging of mahogany. Since implementation of a new legal framework for more responsible forest management in Peru (the 2000 Forestry and Wildlife Law N° 27308), private small-medium forest enterprises (SMFEs)[1] have become the main social actors engaged in commercial forestry through the granting of long-term forest concessions that requires the elaboration of management plans. Despite the key role that SMFEs are playing in the management of the production forests of Madre de Dios and the local economy, there is little information available with respect to their economic performance and capacities.

This article summarizes the results of an evaluation of the capital and capabilities of 29 private SMFEs which were granted forest concessions (for a period of 40 years) in Madre de Dios in 2002. The study was carried out to address the extent to which different capital assets differentiate among SMFEs, and how those assets influence their forest management relative to that prescribed by the Peruvian Forestry Law. SMFE managers were interviewed about the forms of capital (i.e., produced, natural, human, and social)[2] that defined the productive assets they needed to pursue their management activities. These forms of capital, constituting the main components of SMFE capacity, were measured in terms of capital accumulated for each SMFE's first five years of operation (i.e., from 2002 to 2006)[3]. An exploratory factor analysis was used to determine the number of indicators that best represented each type of capital, and an analysis of variance determined variation in the capital of private SMFEs in the three provinces of Madre de Dios to allow geographic comparisons.

Capacities for forest management

SMFEs in Madre de Dios exhibit varying capacities for forest management among provinces; especially in terms of their produced and natural capital assets (see table). SMFEs in Tahuamanu exhibited larger values of produced capital (i.e., more value in equipment and constructed roads, more value in loans received and larger areas) than in Tambopata and Manu. Also, SMFEs in Tahuamanu had greater volumes of mahogany (the most valuable timber species in the country) than in Tambopata and Manu. In Tambopata, SMFEs had almost double the approved volume of cedar (the second most valuable species in the country) than SMFEs in the other two provinces. SMFEs in Manu were characterized by the presence of lower priced and lesser-known timber species, which also explains the need to harvest larger volumes of timber (70% of their

1 In Peru, private SMFEs are defined as enterprises formed by sole proprietors or groups of individuals with gross capital of less than US$3,000,000; furthermore, they employ less than 200 permanent workers engaged in timber management through the holding of forest concessions.

2 Produced capital refers to material, human-made and financial resources. Natural capital is the timber stocks. Human capital refers to the skills of individuals and their acquired knowledge of activities. Social capital includes features of social organization that facilitate cooperation and coordination.

3 This period constitutes a grace period that the State granted to SMFEs to manage their forests without the elaboration of a forest inventory of their concession area (instead using only an existing governmental study), and included a promotional regime of discounts on the payment of harvesting fees.

total approved volume) in this province to compensate for the lower market value. The presence of mahogany provided SMFEs in Tahuamanu with financial advantages that allowed them to fulfill their operational obligations and invest in better equipment, which was not the case of SMFEs in the other two provinces.

In contrast, there is not much variation in SMFE capacities among the three provinces of Madre de Dios in terms of their human and social capital assets (see table). Most SMFEs were formed as associations called *Sociedades Anónimas Cerradas*, allowing up to 20 members and dividing the capital of the enterprise into shares. Such associations constituted a means for small loggers to pool their individually limited capital to form a more viable enterprise. However, associations also created disadvantages for several SMFEs due to disagreements and misunderstandings among members. This caused many divisions among members and affected the operations and management of SMFEs and their concessions. Limited coordination also hampered enterprises in payment of their harvesting fees on time because of disagreements among members over the amount necessary to fulfill their respective responsibilities. The lack of effective organization also limited SMFEs opportunities to receive assistance from NGOs.

Many SMFE members in Tahuamanu and Tambopata had prior experience in logging mainly due to informal activities. Consequently, most SMFE knowledge of logging was limited to the selective extraction of mahogany and cedar. With the new forest regime, concessionaires have been exposed to the concept of sustainable forest management (versus simple timber extraction) with its greater technical demands. However, formal training was limited to a few SMFEs via assistance by NGOs, and it was not sustained with no follow-up training after the NGO assistance ended.

Conclusion

SMFEs in Madre de Dios vary greatly in terms of their forest management capabilities. Most SMFEs lack adequate capacity for sustainable forest management. However those that attained FSC certification had more valuable timber resources and physical infrastructure. SMFE capacities depend greatly on external mechanisms to ensure consistent technical and financial assistance. Important implications of this study include the need for policies that can strengthen the institutional framework to maintain more responsible forest practices in the future and can develop SMFEs' capacities for forest management with mechanisms that secure on-going assistance as well as access to information.

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Indicators of forest management capacity for private SMFEs in Madre de Dios, 2002-2006

Indicators	Tahuamanu n=12	Tambopata n=6	Manu n=9	Total n=27
Produced capital				
Equipment ($)	113,940 [a, b]	14,237 [a]	6,960 [b]	56,124
Roads ($)	169,083 [b]	22,906	2,587 [b]	81,100
Harvesting fee ($)	122,892 [b]	88,631	48,477 [b]	90,473
Loan ($)	55,953	7,504	8,189	29,265
Management plans ($)	42,222 [b]	20,380	10,657 [b]	26,847
Area (ha)	40,595 [b]	24,242	18,899 [b]	29,729
Natural capital				
Approved timber volume (m^3/ha)	34.54	26.35	35.25	32.96
A category	2.26 [a, b]	0.79 [a, c]	0.22 [b, c]	1.25
B category	0.76 [a]	1.87 [a, c]	0.88 [c]	1.05
C category	5.35 [a, b]	16.24 [a]	20.63 [b]	12.86
D category	14.10 [a, b]	2.94 [a]	3.38 [b]	8.04
E category	12.08 [a]	4.51 [a]	10.14	9.75
Species per POA (N°)	14.67	12.30	14.12	13.96
Harvested timber volume (m^3/ha)	6.34 [b]	13.29	24.63 [b]	13.98
A category	1.87 [b]	0.79 [c]	0.22 [b, c]	1.08
B category	0.23 [a]	1.54 [a, c]	0.60 [c]	0.64
C category	0.56 [a, b]	8.72 [a]	16.51 [b]	7.69
D category	2.77	0.85	1.71	1.99
E category	0.92 [b]	1.41 [c]	5.58 [b, c]	2.58
Species per POA (N°)	4.40 [b]	7.10	11.10 [b]	7.23
Human capital				
Enterprise members (N°)	7.42	4.83	10.33	7.81
Logging experience (N° members)	7.00	3.83	4.33	5.41
Business experience (N° members)	7.00	4.17	4.33	5.48
Education (schooling years)	12.50	11.00	10.56	11.52
Members' performance (%)	66.68	72.25	66.68	67.92
Social capital				
Density of membership (N°)	0.58	1.17 c	0.11 c	0.56
Participation (%)	80.75	79.47	74.33	78.33
Networks (%)	53.96	60.32	53.94	55.37
Exclusion (%)	36.90	16.67	25.40	28.57
Trust (%)	73.61	79.87	73.61	75.00
Conflict (%)	16.70	0	11.11	

Notes: [a] denotes 95% significance between Tahuamanu and Tambopata
[b] denotes 95% significance between Tahuamanu and Manu
[c] denotes 95% significance between Tambopata and Manu
POA = annual operating plan

Big investment: The value of equipment possessed by SMFEs in Tahuamanu (some of which are FSC certified) was much larger than in other regions. *Photo: R. Cossío*

2012 Fellowships awarded

Spring: 28 awards, total value US$140,750, 17 countries, 13 female fellows

Mr. **Adedeji**, Gabriel Adetoye Adedeji (Nigeria) PhD program in forest resources management, University of Ibadan, Nigeria; Ms. **Appiah**, Catherine (Ghana) PhD research in plant ecology, Hokkaido University, Sapporo, Japan and study visit to Harvard University Forest, U.S.A.; Dr. **Awoyemi**, Lawrence (Nigeria) Study tour on "Turning Environmental Filth Into Wealth: Production of Wood Plastic Composites From the Sawmill Waste", Oregon State University, Corvallis, U.S.A.; Dr. **Carvalho**, Alexandre Monteiro (Brazil) 12th World Conference on Timber Engineering, Auckland, New Zealand; Ms. **Chiu Lopez**, Brenda Geydi (Mexico) Short training internship on "Five Year Management and Monitoring Plan for Billy Barquedier National Park, Stann Creek Valley Road, Belize", Steadfast Tourism and Conservation Association, Belize; Mr. **Daramola**, Tolulope Mayowa (Nigeria) Research internship, School of Environmental and Forest Sciences, University of Washington, Seattle, U.S.A.; Mr. **Dimobe**, Kangbéni (Togo) PhD research on "Contribution to the Management of Woodland Wildlife Reserve of the Oti-Mandouri in Northern Togo: Natural Regeneration, Structure, Dynamics and Impacts of Recent Climate Changes", University of Lome, Togo; Ms. **Flores Ramírez**, Guadalupe Araceli (Mexico) Masters program in international ecology at ECOSUR, Chetumal, Mexico (in collaboration with University of Sherbrooke, Quebec, Canada); Ms. **Gonmadje**, Christelle Flore (Cameroon) PhD research on "Characterization of Plant Diversity and Sustainable Management of Tropical Forest Ecosystems" at Agricultural Research Institute For Development (IRAD) National Herbarium, Yaounde, Cameroon; Ing. **González Cabello**, Frida Blanca Ismenia (Peru) XXIV International Intensive Course on Diversified Management of Tropical Natural Forests at CATIE, Turrialba, Costa Rica; Ms. **Ilieva**, Lili Encheva (Bulgaria) PhD research on "Paving the Way to Designing a REDD Framework: Pro-poor Benefits Distribution in the Brazilian Amazon" under the supervision of Amazon Environmental Research Institute (IPAM), Brasilia, Brazil; Mr. **Lokossou**, Achille Orphée (Benin) Masters program in management of natural resources and biodiversity at University of Abomey, Calavi, Benin; Dr. **Momo Solefack**, Marie Caroline (Cameroon) Study tour on "Demographic Characterization and Anatomy of *Gnidia glauca* (Thymelaeaceae) on Mount Oku" to the Royal Museum for Central Africa in Tervuren, Belgium; Dr. **Ne Win**, Rosy (Myanmar) Technical document on "Population Dynamics of Commercial Tree Seedlings after Selective Logging in Kabaung Reserved Forest of Bago Mountains, Myanmar"; Mr. **Nugroho**, Brainindityo (Indonesia) 40th International Forestry Student Symposium in Yagmur, Turkey; Ms. **Obeng**, Gifty (Ghana) Masters research on "Conversion of an Agroforestry System into Clean Development Mechanism Forestry in Ghana: Capacity Assessment of Kranka Community Farm Plantation" at Brandenburg University of Technology, Cottbus, Germany; Mr. **Palacios Hernández**, Fernando Nohelio (Guatemala) XXIV International Intensive Course on Diversified Management of Tropical Natural Forests at CATIE, Turrialba, Costa Rica; Ing. **Pinzon Rivas**, Agusto Gregorio (Ecuador) XXIV International Intensive Course on Diversified Management of Tropical Natural Forests at CATIE, Turrialba, Costa Rica; Ms. **Putri**, Winda Utami (Indonesia) Vegetation Survery Training Course at Royal Botanical Gardens, Kew, U.K.; Ms. **Racelis**, Elenita Licong (Philippines) International Conference on Sustainable Forest Management Adapting to Climate Change in Beijing, China; Dr. **Ramachandran**, Sundararaj (India) International Sandalwood Symposium 2012 at University of Hawaii, Honolulu, U.S.A.; Ing. **Requena Rojas**, Edilson Jimmy (Peru) Study tour on "Growth Rate of *Cederela odorata* and its Effects on Precipitation and Temperature in the Long Term Growth in the Central Amazon in Peru" at the Argentine Institute of Snow Research Glaciology and Environmental Science in Mendoza, Argentina; Ms. **Reyes Carranza**, Laura Mariana (Mexico) Short course on "Economic Basis for the Management and Valuation of Environmental Services" at CATIE in Turrialba, Costa Rica; Mr. **Sugianto**, Antonius (Indonesia) Intensive training course on "Advanced Furniture Production, Furniture Design and Wood Machining" at the University of Melbourne and study visit to furniture manufacturing companies and International Furniture Exhibition FURNITEX in Melbourne, Australia; Mr. **Suryoatmono**, Bambang (Indonesia) 12th World Conference on Timber Engineering in Auckland, New Zealand; Dr. **Thulasidas**, Puthenpurayil Kumaran (India) IUFRO All Division 5 Conference in Lisbon, Portugal; Ms. **Viguera Moreno**, Bárbara (Spain) XXIV International Intensive Course on Diversified Management of Tropical Natural Forests at CATIE, Turrialba, Costa Rica; Dr. **Zobi**, Irié Casimir (Côte d'Ivoire) Technical document on "Contribution to Sustainable Forest Management of Natural Wetlands in Côte d'Ivoire: Modeling the Dynamics of Major Species of Permanent Silvicultural Systems of Mopri and Irobo"

Autumn: 23 awards, total value US$148,435, 15 countries, 10 female fellows

Ms. **Akpene**, Afiwa Dzibgodi Akpene (Togo) Technical document on "Development of a Strategy for Improving the Performance of Teak in Togo"; Ms. **Arellano Nicolás**, Edith (Mexico) Masters program in management and conservation of tropical forests and biodiversity at CATIE in Turrialba, Costa Rica; Dr. **Assogbadjo**, Achille Ephrem (Benin) Technical document on "Assessing Population Structure and Dynamics of the Declining *Afzelia africana* Sm. Tree Species for its Sustainable Management in the Protected Areas of Benin (West Africa)"; Mr. **Bandoh**, William Kwame Nuako (Ghana) Short training course on "Application of Molecular Genetic Markers for Timber Tracking in Africa" at Kenya Forestry Research Institute in Nairobi; Dr. **Fongnzossie**, Fedoung Evariste (Cameroon) Research on "Assessment of Vulnerability to Climate Change in Adjacent Community of Mangrove Forests in Manoka Island, Litoral Region in Cameroon"; Mr. **Geply**, Johnson Jlokpeh (Liberia) PhD research on "Assessment of Liberia Forest Policy and Administration before and after the Civil War" at the University of Ibadan, Nigeria; Ms. **Heindorf**, Claudia (Germany) Technical document "Manual of Sustainable Forestry Practices in the Tropics of Mexico that Increase Productivity and Contribute to National Goals of Mitigating the Effects of Climate Change"; Dr. **Javaregowda**, Javaregowda (India) Short training course on "Competing Claims on Natural Resources: Professional Qualities for Managing Conflict in Natural Resource Management towards Sustainable Development" at Wageningen UR Centre for Development Innovation in the Netherlands; Mr. **Kurniawan**, Yuyun (Indonesia) Masters research on "Tropical Forest Dynamics after Logging: A Comparison Study between RIL and Non- RIL Practices in Relation with Biodiversity and Forest Carbon Stock" at University of Mulawarman, Indonesia; Ms. **Maroundou**, Audrey Pamela (Gabon) Short training internship on "Method and Techniques of GIS" at Institute of Tropical Ecology, Toulouse, France; Ms. **Massou**, Pamera Bibi-ntu (Côte d'Ivoire) PhD research on "Quantifying the Spatial and Temporal Variation in Aboveground Biomass in the Tropical Forest of Congo Basin under the REDD+ Context" at the University of Tübingen, Germany; Dr. **Maza Rojas**, Byron Vinicio (Ecuador) Lecture tour and Workshop on "Demonstration of Forest Industry in Chile", University of Lagos, Paillacar Alberto Silva, Chile; Mr. **Mensah**, John Kobina (Ghana) Short training course on "Application of Molecular Genetic Markers for Timber Tracking in Africa" at Kenya Forestry Research Institute in Nairobi; Mr. **Minn**, Yazar (Myanmar) World Teak Conference 2013 in Bangkok, Thailand; Dr. **Ndiade Bourobou**, Dyana (Gabon) Short training course on "Application of Molecular Genetic Markers for Timber Tracking in Africa" at Kenya Forestry Research Institute in Nairobi; Mr. **Njurumana**, Gerson Ndawa (Indonesia) PhD research on "Environmental Conservation Development on Kaliwu System at Sumba Island", Gadjah Mada University, Yogyakarta, Indonesia; Mr. **Opoku-Ameyaw**, Adu (Ghana) Masters research on "Seasonality and Environmental Determinants of Total and Component Soil CO2 Efflux in an Intact Tropical Moist Semi-deciduous Forest in Ghana", Kwame Krumah University of Science and Technology, Kumasi, Ghana; Ing. **Romero Rodriguez**, Irma Betty (Peru) XXV Intensive International Course on "Diversified Management of Tropical Natural Forests" at CATIE in Turrialba, Costa Rica; Ms. **Saha Tchinda**, Jean-Bosco (Cameroon) Short training internship on "Recovery of Waste Wood through the Isolation of Molecules with High Potential: Case of Waste of Azobe, Padouk, Tali and Moabi" at CIRAD in Montpellier, France; Ms. **Saw**, Aye Aye (Myanmar) Masters research on "Simulation Model of Community Based Mangrove Ecosystem Conservation and Rural Development in Myanmar: Case Study in Wunbaik Mangrove of Rakhine Coastal" at Kyoto University, Japan; Ms. **Tonouewa**, Murielle Jesugnon Fifamè Féty (Benin) Short training internship on "Physical and Mechanical Characterization of Wood of *Gmelina arborea* Roxb. of Benin" at CIRAD in Montpellier, France; Dr. **Wahyudi** (Indonesia) Publication of textbook "Non-Timber Forest Products" (in Indonesian); Ms. **Wong**, Melissa (Malaysia) IUFRO Annual Forest Tree Workshop in conjunction with Plant and Animal Genomes XXI Conference in San Diego, U.S.A.

ITTO Fellowship Program

ITTO offers fellowships through the Freezailah Fellowship Fund to promote human resource development and to strengthen professional tropical forestry and related expertise in member countries. The goal is to promote the sustainable management of tropical forests, the efficient use and processing of tropical timber, and better economic information about the international trade in tropical timber.

The next deadline for applications is 23 August 2013. Fellowship activities should begin not earlier than 1 February 2014.

Please apply on-line at www.itto.int. Further details are available at www.itto.int or from Dr. Chisato Aoki, Fellowship Program, ITTO; fellowship@itto.int; Fax 81 45 223 1111 (see page 2 for ITTO's postal address)

Market trends

European wooden furniture production and imports down from pre-crisis levels[1]

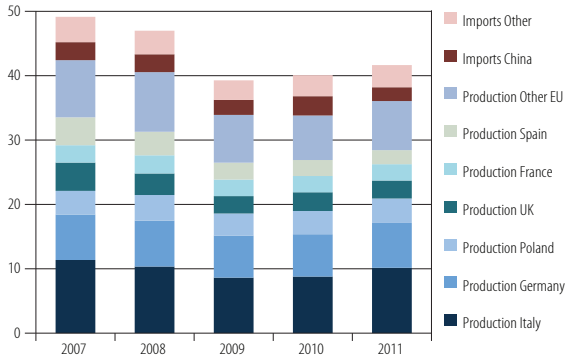
Rupert Oliver

Forest Industries Intelligence Ltd.
(rjoliver@btopenworld.com)

The EU's furniture sector remains a major global player, not just due to its size but also because of its role in influencing international fashion and design trends. The EU accounts for around one quarter of world furniture production and consumption. However, the EU's role in the global furniture market has changed dramatically during the last decade, particularly during the financial crises in western countries.

In 2011, EU production of wood furniture was valued at €36 billion, down from €42 billion in 2007 (Figure 1). The EU has moved from the first to the second position (after China) amongst the world's major producing areas.

Figure 1. EU-25 wooden furniture supply (billion €)



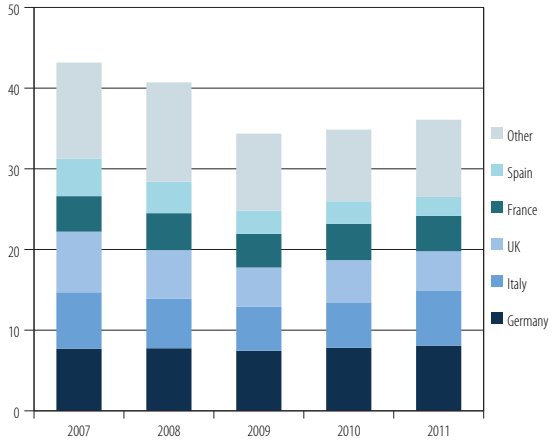
While furniture manufacturing in Eastern Europe has risen during the last decade, particularly in Poland, the traditional western European manufacturing countries still retain a very large share of EU furniture production capacity. In fact, the two largest western European producers, Italy and Germany, together account for over 40% of all wood furniture supplied into the EU, and this share was actually rising during 2007 to 2011. Despite widespread reports of declining consumption and intense competition during those years, the value of wood furniture production in the leading western European manufacturing countries remained very resilient.

In addition to being major producers, European countries remain major consumers of furniture products despite the recession (Figure 2). EU wood furniture consumption fell from €43.2 billion to €34.4 billion between 2007 and 2009. Consumption then recovered slowly to 36.1 billion in 2011. The recovery was particularly robust in Germany, now the EU's largest market. Germany consumed €8.1 billion of wood furniture in 2011, up from €7.4 billion in 2009. There was also strong recovery in Italy, the EU's second largest market for wood furniture. Italian wood furniture consumption increased from €5.5 billion in 2009 to €6.8 billion in 2011. In the UK and France wood furniture consumption was quite stable between 2009 and 2011 at around €5 billion and €4.4 billion respectively. However consumption in Spain continued to fall during this period from €2.9 billion in 2009 to €2.4 billion in 2011.

Domestic manufacturers continue to dominate European market

While the EU's presence on the global furniture market has declined in recent years, European manufacturers have remained very dominant in their domestic markets. The share of imports in total EU wood furniture supply peaked at only 16% in 2010 before falling away again to 13% in 2011. This is in contrast to the United States, for example, where a very large section of the furniture manufacturing industry shifted to lower cost locations, particularly China, during the 2000 to 2008 period.

Figure 2. EU-25 wooden furniture consumption (billion €)



The continuing dominance of local manufacturers in the European market might seem surprising given relatively high labour and other costs of production in Europe. There a number of reasons for this. One factor is the high level of investment in machinery and product development in the European furniture sector. This has reduced the relative contribution of labour to overall costs, and placed a premium on technical, design and market knowledge. It has boosted the general quality of European products and perceived value of European brands. European manufacturers have built on this through sophisticated marketing and communication campaigns. This in turn has encouraged high levels of loyalty to European products amongst consumers.

European manufacturers have also exploited other advantages of proximity to the consumer. Increasingly important factors in wood furniture marketing include the ability to supply quickly on demand, respond rapidly to changing tastes, and to provide customers with support services – including "no-questions-asked" guarantees for customers wanting to return products. In many European countries, the retailing sector is quite fragmented with many smaller companies. Selling into these countries requires local knowledge and a large network of contacts. It is no accident that the UK, where the retailing sector is more dominated by large companies, is also the European country with the largest market penetration by Chinese and other Asian suppliers.

For all these reasons, European manufacturers choosing to relocate during the last decade have tended to opt for countries in Eastern Europe which offer a good compromise between lower costs of production and continued proximity to the large consuming markets of Western Europe. German manufacturers have tended to shift to Poland, while many Italian manufacturers opted for Slovenia.

The IKEA factor

It is not possible to discuss the distribution of wood furniture manufacturing in Europe without reference to IKEA. The Swedish-based corporate giant operates a network of 332 stores in 38 countries and has a global annual turnover of $31 billion. As such, IKEA claims 6.1% of the entire world furniture market. Around three quarters of IKEA's sales are in Europe where it is hugely dominant at the budget end of the market.

While IKEA has been expanding sales operations into other parts of the world, its manufacturing base remains firmly rooted in Europe. IKEA's wood furniture manufacturing facilities are operated by the IKEA subsidiary Swedwood. This company currently manages 49 production units, all but two of which are in Europe (the others being in Russia and the USA). Swedwood facilities employ around 17 000 people and manufacture approximately 100 million units of furniture each year. Around two thirds of Swedwood production is in eastern European countries, with a high concentration in Poland. Much of the rest of production is located in Western Europe (Sweden, Germany and Portugal).

Operating under its lean production concept, the Swedwood Way of Production (SWOP), the organisation has forced down costs by focusing heavily on efficiency and waste reduction. There is considerable investment in R&D, both to increase efficiency and product quality. This is seen as vital to the company's reputation and success. The business has become a leader in robotic automation of the furniture manufacturing process. Swedwood also sees it as vital to be located close to its market in order to respond to local demands.

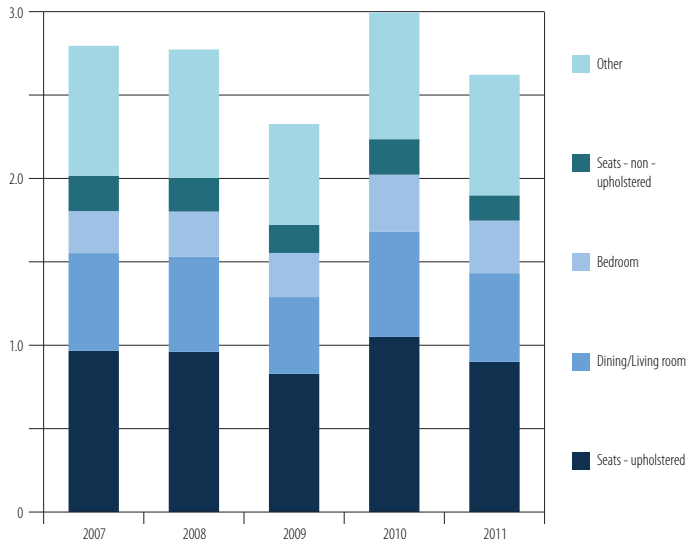
Until the onset of recession, Swedwood was very actively increasing production activity close to large consuming markets in Europe and North America. In 2008 it opened five new state-of-the-art factories in Sweden, Poland, Russia, the US and Portugal. Since then the company has temporarily suspended its plans to increase capacity. However its' long term strategy, once demand begins to pick up, is to further expand manufacturing in Europe and other large consuming markets.

China's position in the EU furniture market

EU imports of wood furniture from China have been very volatile in recent years (Figure 3). Imports fell sharply at the height of the financial crisis, from €2.8 billion in 2008 to only €2.3 billion in 2009. However they then rebounded strongly to reach a peak of €3 billion in 2010.

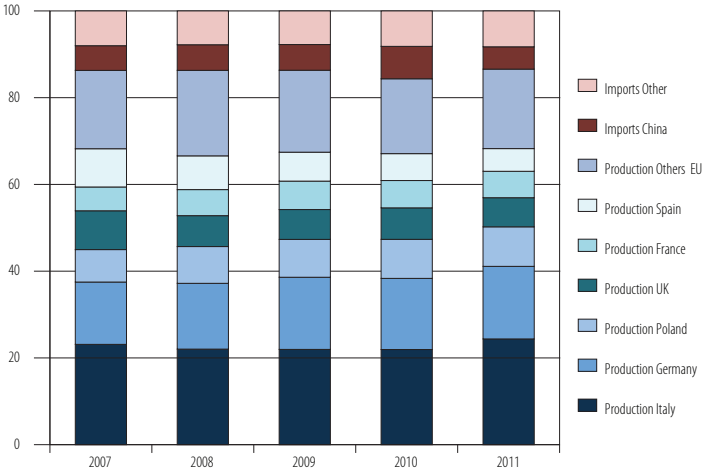
However, this import level seriously over-shot actual consumption and imports fell back again to €2.6 billion in 2011. In 2011, upholstered seating was the main wood furniture product imported into the EU from China, accounting for 34% of import value. Of the remainder, 20% was dining/living room furniture, 12% was bedroom furniture, 6% was non-upholstered seating and 28% other product categories.

Figure 3. EU-25 wooden furniture imports from China (billion €)



China's share in total EU wood furniture consumption peaked in 2010, at 8%, before falling away to 6% in 2011 (Figure 4). China's penetration of the market varies widely between EU Member States, from 16% in the UK to less than 2% in Italy.

Figure 4. Share of EU-25 wooden furniture supply by source (%)



Recent trends and outlook for the European furniture market

The most recent Eurostat data indicates that wood furniture production across the EU region was only around 83% of pre-recession levels during 2012 and is still trending downwards. Furniture production during the first nine months of 2012 in Italy, Poland, the UK, France and Spain was significantly lower than during the same period the previous year. However production in Germany during 2012 was higher than in 2011. It seems likely that many markets will continue to be impacted by fall-out and further developments from the euro crisis.

Read the bi-weekly ITTO MIS on www.itto.int.

Topical & tropical

Compiled and edited by Ken Sato

Yum! Brands shows good taste in greener practices

In a forest policy statement released by the company in April, Yum! Brands is moving toward sustainable sourcing by ensuring that paper and paper-based packaging products they buy do not knowingly come from illegal or other unwanted fiber sources, as well as giving preference to suppliers who source wood fiber certified by a third-party. The policy seeks to source fiber from forests which meet the most rigorous forest management standards, such as the Forest Stewardship Council and other national certification systems that are endorsed by the Program for Endorsement of Forest Certification (PEFC). The policy rules out purchases of wood harvested in a manner that violates human rights, wood harvested in violation of local or international laws, wood from high conservation value forests (unless those forests are credibly certified), wood harvested from natural forests that have been converted to plantations or non-forest use and wood whose source is unknown. The policy commits Yum! Brands to sustainable packaging through increasing the amount of recycled content in packaging, as permitted by regulatory and technical constraints, across their global system and within packaging content regulations to ensure food safety, as well as within performance criteria to retain functionality. Though there are some limitations regarding available supply of recycled material in some geographical areas, they will work to leverage sustainable practices into all of their wrappers, napkins, and containers worldwide. The company, which owns the KFC, Pizza Hut and Taco Bell brands, promises a detailed procurement plan for implementing the policy by 2014.

Rougier obtains FSC certification in Cameroon

Rougier, a company with significant African tropical timber interests, has recently obtained Forest Stewardship Council certification for three forest concessions located in the Mbang forest area in South East Cameroon and managed by the Rougier subsidiary SFID (Société Forestière et Industrielle de la Doumé). The certification was obtained for forest management units (FMUs) representing a total of 285 667 hectares of forest. This certification will allow Rougier to market a full range of FSC certified products with a "FSC 100%" declaration, including logs and sawn timber from all of Cameroon's traditional tree species, as well as a large variety of machined products (glued laminated finger-joints, decking, joists with CE marking, finger-jointed beams carrying KOMO certification, etc.) from various species, notably: ayous, sapele, tali, frake, okan, etc.

The certification of these Cameroonian FMUs will assist Rougier to comply with the European Union's regulation of international trade in timber (FLEGT) which came into force in March 2013. Rougier's FSC certification goes beyond legality requirements providing customers with the guarantee that all marketed timber comes from responsibly managed forest concessions in compliance with strict social and environmental criteria. The company's efforts toward certification are part of a global strategy to commit to product traceability, renewability of resources and local development.

Reports suggest EUTR already driving changes in trade

ITTO's Market Information Service reported recently that significant changes are emerging in the EU's timber trade with China as a result of the EU Timber Regulation (EUTR), which entered into force on 3 March 2013. Most reports of changes relate to plywood which is widely expected to be targeted by environmental groups hoping to raise awareness of EUTR by encouraging an early prosecution case.

The EUTR makes importers personally liable and subject to potentially severe sanctions if they are found to be handling wood from an illegal source. They are also liable if they fail to demonstrate implementation of a "due diligence system" in line with requirements set out in the regulation. EU government authorities have to date generally been slow in building up capacity to enforce the law. However many importers are already taking action to ensure legal compliance. This appears to be due to fear of the negative publicity and business disruption surrounding a possible prosecution case as much as to the potential legal sanctions.

At the end of 2012, there were reports of some EU plywood importers taking early action to build up landed stocks of sensitive products, notably uncertified plywood manufactured in China, in advance of the 3rd March 2013 deadline. The aim was to ensure they had sufficient material on the ground in Europe to give breathing space for introduction of due diligence systems. As these systems begin being implemented, European importers are now much more selective in the plywood products being bought from China.

Poplar/bintangor plywood and mixed light hardwood plywood with bintangor, red canarium, red pencil cedar or similar types of veneers are mainly affected. European importers are concerned that the legal origin of these wood types cannot be documented with sufficient certainty. Some importers are also not ordering birch plywood and softwood plywood with Russian spruce veneers made in China. This is due to concern that procedures for verifying the legality of Russian logs imported into China are inadequate.

Recent editions

Compiled and edited by Ken Sato

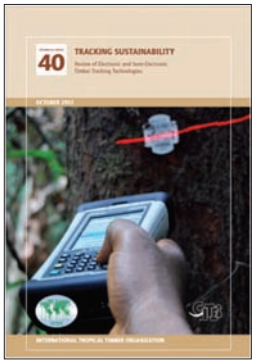
Maplesden, F. (lead author), Attah, A., Tomaselli, I. and Wong, N. 2013. *Technical Series #41: Riding out the storm*. ITTO, Yokohama, Japan. ISBN 4-902045-98-2

Available from: http://www.itto.int/technical_reports/

This report was developed through an activity under ITTO's Thematic Programme on Trade and Market Transparency based on concerns expressed by ITTO producer member countries that the recent global economic crisis had exposed the vulnerability and lack of preparedness of the tropical timber sector to manage future global and regional economic crises.

It draws on a broad knowledge base and experiences in producer and consumer countries in addition to other wood and non-wood industries and recommends a number of measures to be adopted by ITTO, ITTO member countries, regional organizations and forest industry and trade associations, to support the tropical timber sector's resilience to global economic shocks. The future ability of the tropical timber sector to supply products from sustainably managed and legally harvested sources is inextricably linked to the resilience of the sector to external economic shocks and the policy actions undertaken by ITTO producer countries. This report is recommended to all operators in the tropical timber sector and other stakeholders concerned about the sustainability of tropical forests in general.

Seidel, F., Fripp, E., Adams, A. and Denty, I. 2012. *Technical Series #40: Tracking Sustainability*. ITTO, Yokohama, Japan. ISBN 4-902045-95-8



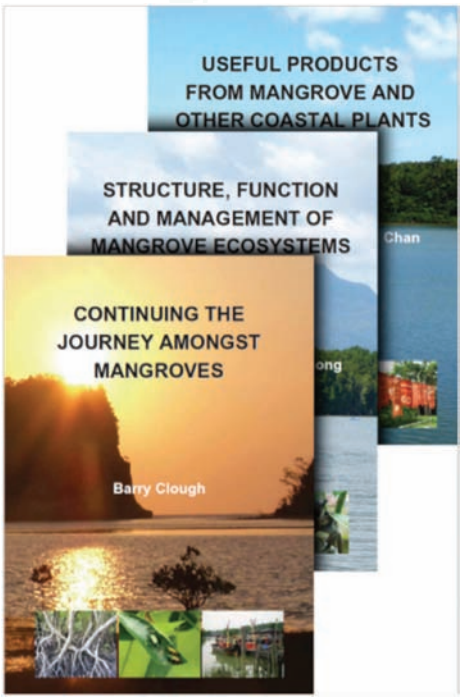
Available from: http://www.itto.int/technical_reports/

Timber tracking and timber products tracking technologies are relatively new and are gaining increasing importance through changing consumer and policy demands. As the scope of forest products in international trade continues to increase in tandem with the complexity of global supply chains, timber and forest product tracking technologies will play an increasing role in ensuring sustainable and legal supplies of these essential products. This report, developed jointly with CITES, is a useful guide to these rapidly evolving technologies.

Clough, B. 2013. *Continuing the Journey Amongst Mangroves*; Ong, J.E. and Gong, W.K. 2013. *Structure, Function and Management of Mangrove Ecosystems*; Baba, S., Chan, H.T. and Aksornkoae, S. 2013. *Useful Products from Mangrove and other Coastal Plants*. ISME Mangrove Educational Book Series Nos. 1-3. International Society for Mangrove Ecosystems (ISME), Okinawa, Japan. ISBN 978-4-906584-16-1

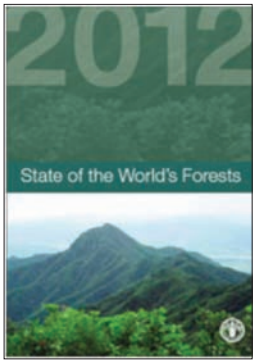
Available from: http://www.itto.int/project_outputs/

These three books, published under ITTO/ISME Project PD 564/09 Rev. 1 (F) entitled Production of an Educational Book Series on Mangroves for Sustainable Management and Utilization of Mangrove Ecosystems, funded by ITTO and the Government of Japan, represent the beginning of the ISME Mangrove Educational Book Series.



The first book, a sequel to an ITTO-sponsored publication from 1995 Journey Amongst Mangroves, authored by C.D. Field, aims to present the nature and importance of mangroves to as wide an audience as possible. Continuing the Journey Amongst Mangroves is written with the same objectives as its predecessor and aims to provide a general introduction to mangroves to prepare readers for the two accompanying volumes, which cover a number of the topics in much greater detail. The second book, Structure, Function and Management of Mangrove Ecosystems is about mangrove plants and animals that colonize the main part of the intertidal zone in the tropics and subtropics. It highlights the structure, function, state of health, and the sustainable economic and ecological management of mangrove forests. The third book, Useful Products from Mangrove and other Coastal Plants, examines 72 case studies of all traditional and recent uses of mangrove wood and non-wood products in different regions of the world.

FAO Forestry Department. 2012. *State of the World's Forests 2012*. FAO, Rome, Italy. ISBN 9789251072929



Available from: http://www.fao.org/docrep/016/i3010e/i3010e.pdf

This tenth edition of State of the World's Forests, intended to serve as a reference source to support policy and research related to forests, explores the role of forests in human history, finding strong links between forest use and economic and social development. It suggests that forest production has an important role to play in a sustainable future in which consumption and production are connected in a closed cycle and it also points out the importance of striking a balance between forest conservation and use.

Recently funded projects

Full or partial funding for the following new projects was announced at the 48th session of the International Tropical Timber Council in 2012. Several projects were also funded in 2012 through ITTO's Thematic Programmes; these are listed at the end of this section. Donors also supported activities under ITTO's Biennial Work Programme in 2012, including significant new contributions to the ITTO-CITES Programme. Total funding for ITTO's projects, programmes and activities in 2012 came to US$9 million. More information on projects and activities funded by ITTO is available from the ITTO Secretariat (itto@itto.int) or on www.itto.int.

Building the capacities of forestry training institutions members of the Network of Central African Forestry and Environmental Training Institutions (RIFFEAC) for providing SFM training for forest concessions - Capacity building for sustainable management of tropical rainforests and biodiversity conservation in the ITTO Congo basin countries

Project number: PD 456/07 Rev.4 (F)

Budget:

ITTO - US$4,408,557
Japan - US$3,523,645
Switzerland - US$270,000
Belgium - US$97,037
Outstanding balance - US$517,875
RIFFEAC Training Institutions - US$110,300
Total - US$4,518,857

Implementing agency: RIFFEAC Secretariat

This project will contribute to building human resources capacities required to achieve sustainable forest ecosystem management in the Congo basin by reconciling social economic imperatives and the maintenance of ecological balances. The project specifically intends to build the capacities of environmental and forestry training institutions in Central Africa under the aegis of the regional organization RIFFEAC to ensure they are capable to train qualified personnel to implement sustainable forest management, while ensuring biodiversity conservation in the Congo Basin. This project was funded as part of ITTO's collaborative program with CBD.

Improving forest functions in Bengkulu Province (Indonesia) through community participation in rehabilitation of degraded forest by using local prospective commodities

Project number: PD 477/07 Rev.4 (F))

Budget:

ITTO - US$338,256
Japan - US$338,256
Government of Indonesia - US$92,168 (in kind)
Total - US$430,424

Implementing agency: Forestry Service of Bengkulu Province

The project aims to contribute to the sustainable management of tropical forests in Indonesia's Bengkulu province through rehabilitation of degraded forest lands with promising indigenous species. Rehabilitation activities will be carried out by local communities in the project site. The specific objectives of the project are: (i) to implement suitable technology for the production of high quality planting materials of locally adapted species for plantations; and (ii) to improve stakeholder involvement in forest management and community development through successful plantations of local indigenous species.

Establishing a Geographic Information System for the Sustainable Management of the Forest Areas of Togo

Project number: PD 581/10 Rev.2 (F)

Budget:

ITTO - US$345,840
Japan - US$345,840
Government of Togo - US$219,683
Total - US$565,523

Implementing agency: Office of Forest Development and Exploitation (ODEF)

This project aims to contribute to the optimization of forestry potential and sustainable management of forest areas in Togo. It specifically intends to improve the management of forest geo-spatial information. Expected outputs are: collection and processing of forest sector data based on the use of modern equipment and methodology; stakeholders trained in the use of forestry GIS; and a system of decentralized geo-spatial information management for forests.

Promoting biodiversity conservation in Betung Kerihun National Park (BKNP) as the trans-boundary ecosystem between Indonesia and State of Sarawak Malaysia (Phase III)

Project number: PD 617/11 Rev.3 (F)

Budget:

ITTO - US$1,283,191
Switzerland - US$503,486
Japan - US$434,661
USA - US$3,412
Outstanding balance - US$341,632
Government of Indonesia - US$224,920
Total - US$1,508,111

Implementing agency: Directorate General of Forest Protection and Nature Conservation (PHKA), Ministry of Forestry (MOF), Indonesia

The main objective of the project is to promote the sustainable conservation and management of the Betung Kerihun National Park (BKNP), which was established in 1992 through Ministerial Decree and was enlarged to 800 000 ha, in the context of trans-boundary ecosystem management between Indonesia and Malaysia (Sarawak). The project builds on the outcomes of ITTO Project PD 26/93 Rev.1 (F) "Development of Betung Kerihun Nature Reserve as a national park, Phase I" and PD 44/00 Rev.3 (F) "Implementation of a community-based trans-boundary management plan for the Betung Kerihun National Park, West Kalimantan, Indonesia, Phase II".

Traceability of Timber Produced by Forest Concessions and Native Communities in Madre de Dios and Ucayali

Project number: PD 621/11 Rev.3 (M)

Budget:

ITTO - US$349,032
Japan (Forestry Agency) - US$200,000
USA - US$149,032
CNF - US$278,125
Total - US$627,157

Implementing agency: National Forestry Chamber (CNF)

This project is an output of pre-project PPD 138/07 Rev.1 (M) "Verifying the legality of timber forest products in Peru". It will be implemented involving small and medium timber producing enterprises (SMEs), including native communities and forest concessions in Madre de Dios and Ucayali, as well as timber processing and marketing SMEs located in these two regions as well as in Lima and Arequipa. It will promote the use of timber sourced from forests under sustainable management, with the aim of enhancing the transparency of timber marketing and improving forest governance in the Peruvian Amazon region through the participation of indigenous peoples and SMEs as key stakeholders in the conservation of forests.

Development of guidelines for buffer zone management for Pulong Tau National Park and Involvement of Local Communities in management, Sarawak, Malaysia

Project number: PD 635/12 Rev.2 (F)

Budget:

ITTO - US$517,450
Japan - US$242,690
Switzerland - US$224,760
Japan Lumber Importers' Association (JLIA) - US$50,000
Government of Malaysia - US$904,475
Total - US$1,421,925

Implementing agency: Sarawak Forest Department

This project will facilitate the establishment of 6000 ha of buffer zones in Sarawak's Pulong Tau national park (where management was strengthened under a previous ITTO project), and

will secure a forest base to meet local communities' needs. It will study the multiple functions of buffer zones for environmental services like watershed protection, biodiversity conservation and research, and communal use. Guidelines for buffer zone management will be developed and submitted to the government for consideration. The project's outputs and activities will involve baseline surveys to determine the buffer zone's resources for integrated management, assessing local subsistence needs and how the buffer zone will be able to meet these needs.

Sustainable, mixed and pure forest plantation development in the transitional zone of Ghana's Biakoye district assembly, employing poverty reduction strategies

Project number: PD 653/12 Rev.1 (F)

Budget:

ITTO - US$245,272
Japan - US$245,272
Government of Ghana - US$78,816
Total - US$324,088

Implementing agency: PICODEV Ghana, in collaboration with Biakoye District Assembly, Nkonya-Ahenkro. Volta Region

This multi-dimensional project intends to contribute to sustained socio-economic development and environmental protection in the Biakoye area in Ghana's Volta Region. Its specific objective is to initiate a participatory poverty alleviation approach (innovative value added cassava processing and sale) to bring about sustainable forest enrichment and plantation development using tropical timber species of mixed stands and exotic teak (for timber and poles) and *Cassia siamea* (for fuelwood) in pure stands at selected sites in the Biakoye District Assembly area.

Integrated management of natural resources and biodiversity in the Tacaná volcano and its range of influence in Mexico and Guatemala

Project number: PD 668/12 Rev.1 (F)

Budget:

ITTO - US$641,639
Japan - US$441,639
USA - US$200,000
Helvetas Swiss Intercooperation (HSI) - US$67,697
Municipalities (in kind) - US$26,560
Forest Agencies (CONAFOR, CONANP, CONAP and INAB; in kind) - US$213,596
Total - US$949,492

Implementing agency: Helvetas Swiss Intercooperation (HSI)

The objective of the project is to contribute to improving living standards for 28 000 people in Guatemala and Mexico, based on the conservation and sustainable use of local natural resources. More specifically, it will launch a participatory process for natural resource and biodiversity management, conservation and use in the range of influence of the Tacaná volcano in Guatemala and Mexico.

Establishment of a National Forest Statistics Information Management System in Benin

Project number: PD 678/12 Rev.1 (M)

Budget:

ITTO - US$398,704
Japan - US$388,704
Sweden - US$10,000
Government of Benin - US$119,129
Total - US$517,833

Implementing agency: General Directory for Forest and Natural Resources (DGRFN)

This project aims to establish a national information and statistics management system for the sustainable management of forest resources in Benin. It will be implemented in a participatory way focusing on: (i) establishing a mechanism for consultation and coordination of the different structures for the collection and management of forestry statistics; (ii) developing and implementing reliable methods for collecting data; and (iii) establishing a modern and functional forest statistics management system. In implementing the project, particular emphasis will be placed on awareness-raising and capacity building for all stakeholders.

Study for the rehabilitation and sustainable management of sacred forests on RAMSAR sites 1017 and 1018 in Benin

Project number: PPD 165/12 Rev.1 (F)

Budget:

ITTO - US$79,380
USA - US$39,380
Japan - US$20,000
Rep. Korea - US$20,000
Benin (Ce.Sa.Re.N - NGO) - US$17,600
Total - US$96,980

Implementing agency: Ce.Sa.Re.N - NGO

Ramsar sites 1017 and 1018 in Benin are dotted with pockets of sacred forests with very rich biodiversity, representing a natural heritage of great value from their multiple biological, ecological and socio-economic functions. These forests are important for biodiversity conservation and play a crucial role in the lives of local people, but are subject to severe degradation that threatens the entire ecosystem and therefore the livelihoods of local people. This pre-project aims to gather the necessary information and data required for the preparation of a project dealing with the rehabilitation and sustainable management of these sacred forests.

Thematic programmes

The following projects were financed during 2012 under ITTO's thematic programmes on Reducing Deforestation and Forest Degradation and Enhancing Environmental Services in Tropical Forests (REDDES), Forest Law Enforcement, Governance and Trade (TFLET) and Trade and Market Transparency (TMT). For summaries of these projects see: http://www.itto.int/thematic_programme_general/.

REDDES (Total - US$815,156)

Identification of a project on gender mainstreaming in the development of actions to control deforestation and forest degradation to improve the well-being of communities dependent on forests and other ecosystems in Central and West Africa

Project number: RED-PPD 074/12 Rev.1 (F)

Budget:

ITTO - US$101,117
Cameroon - US$25,622
Total - US$126,739

Implementing agency: African Women's Network for Community Management of Forests (REFACOF)

Demonstration, investigation and assessment of typical forest ecotourism resources in Hainan province, China

Project number: RED-SPD 075/12 Rev.1 (F)

ITTO - US$145,800
China - US$53,200
Total - US$199,000

Implementing agency: Chinese Academy of Forestry (CAF)

Rehabilitation of degraded forests for sustainable wood fuel production and climate change mitigation in the forest-savanna transition zone of Ghana

Project number: RED-SPD 077/12 Rev.1 (F)

Budget:

ITTO - US$121,662
Ghana - US$47,698
Total - US$169,360

Implementing agency: Forestry Research Institute of Ghana (FORIG)

Strengthening of governance and sustainable management of mangrove ecosystems in Guatemala as a climate change adaptation measure

Project number: RED-SPD 079/12 Rev.1 (F)

Budget:

ITTO - US$146,751
Guatemala - US$68,472
Total - US$215,223

Implementing agency: National Forest Institute (INAB)

Improving efficacy of forestry policies and activities in Liberia through REDD+ demonstration projects

Project number: RED-SPD 084/12 Rev.1 (F)

Budget:

ITTO - US$149,922
Liberia - US$158,796
Total - US$308,718

Implementing agencies: Forest Development Authority and Flora and Fauna International

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Reducing deforestation and forest degradation in the Natchambonga and Djiyega community forests by promoting participatory forestry (Togo)

Project number: RED-SPD 092/12 Rev.1 (F)

Budget:

ITTO - US$149,904
Togo - US$140,473
Total - US$290,377

Implementing agency: Water and Forest Authority

Advancing REDD+ in Ghana: Preparation of REDD+ pilot schemes in off-reserve forests and agroforests

Project number: RED-PD 093/12 Rev.1(F)

Budget:

ITTO - US$297,205
Ghana - US$69,749
Total - US$366,954

Implementing agency: Ghanaian National REDD+ Secretariat

TFLET (Total - US$416,878)

Empowering civil society organizations and other non-state actors to effectively contribute to forest law compliance in Ghana

Project number: TFL-SPD 028/12 Rev.1 (M)

Budget:

ITTO - US$147,701
Ghana - US$40,755
Total - US$188,456

Implementing agency: WWF West Africa Forest Programme

Marketing of timber from legal and sustainable sources by indigenous communities in Ucayali, Peru for the fair trade market

Project number: TFL-SPD 029/12 Rev.1 (M)

Budget:

ITTO - US$137,941
Peru - US$92,350
Total - US$230,291

Implementing agency: Association for Integrated Research and Development (AIDER)

Improved governance and implementation of transparent negotiation mechanisms for indigenous community forestry in Atalaya (Ucayali), Peru

Project number: TFL-SPD 030/12 Rev.1 (M)

Budget:

ITTO - US$131,236
Peru - US$60,027
Total - US$191,263

Implementing agency: Helvetas Swiss Intercooperation (HSI)

TMT (Total - US$538,960)

Preparation of the publication "Atlas of tropical timber species – 1st Edition: Technological characteristics and uses of 273 tropical timber species (and 17 temperate species)

Project number: TMT-SPD 010/12 Rev.1 (M)

Budget:

ITTO - US$ 138,033 (through ITTO-CITES Programme)
France - US$135,756
Total - US$273,789

Implementing agency: Center for International Cooperation in Agronomic Research for Development (CIRAD)

Adaptation and application at the national scale of Trace Bois-Gabon (Gabon timber tracking) for the collection and processing of forest and timber statistics in Gabon

Project number: TMT-SPD 011/12 Rev.2 (M)

Budget:

ITTO - US$138,996
Gabon - US$273,000
Total - US$411,996

Implementing Agency: Ministry of Water and Forest Resources, Central Division of Information Systems

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Improving intra-African trade and market transparency in timber and timber products

Project number: TMT-SPD 012/12 Rev.1 (M)

Budget:

ITTO - US$111,931 (through ITTO-CITES Programme)
Ghana - US$38,065
Total - US$149,996

Implementing agency: Ghana Timber Millers' Organization (GTMO)

Analysis of the economic impact of governmental procurement policies on tropical timber markets

Project number: TMT-SPD 013/12 Rev.1 (M)

Budget:

ITTO - US$150,000
Total - US$150,000
Implementing agency: ITTO

Meetings

22-23 May 2013
FAO Global Timber Forum
Rome, Italy
Contact: Jukka.Tissari@fao.org; http://www.fao.org/forestry/trade/82078/en/

26 May - 1 June 2013
IUFRO Tree Biotechnology Conference
Asheville, NC, USA
Contact: http://treebiotech2013.com/

10-14 June 2013
4th session of the Intergovernmental Negotiating Committee for a Legally Binding Agreement on Forests in Europe (INC-Forests 4)
Warsaw, Poland
Contact: http://www.forestnegotiations.org/; INC-Forests@foresteurope.org

11-12 June 2013
Forests for Future Generations –Public and Private Responsibility for Sustainability
Berlin, Germany
Contact: Birgit.Joussen@bmz.bund.de

11-13 June 2013
Makala project: Conference on management of sustainable wood energy resource in DRC and Congo Brazzaville
Kinshasa, DRC
Contact: http://pfbc-cbfp.org/events_en/events/Makala-EN.html

12-15 June 2013
3rd IUFRO Latin American Congress
San Jose, Costa Rica
Contact: iufrolat@catie.ac.cr

17-18 June 2013
Special Session of the UNECE Timber Committee (TC) with the European Forestry Commission (EFC)
Contact: http://www.unece.org/forests/extraordinarytc-efcmeeting.html

19-21 June 2013
Global Symposium: REDD+ in a Green Economy
Jakarta, Indonesia
Contact: John.Prydz@unep.org; http://www.un-redd.org/REDD_in_Green_Economy_Global_Symposium/tabid/105931/Default.aspx

26-27 June 2013
APEC 4th Meeting of the Experts Group on Illegal Logging and Associated Trade
Medan, Sumatra, Indonesia
Contact: www.apec.org/Groups/SOM-Steering-Committee-on-Economic-and-Technical-Cooperation/Working-Groups/Illegal-Logging-and-Associated-Trade.aspx

3-5 July 2013
Africa Carbon Forum 2013
Abidjan, Cote d'Ivoire.
Contact: http://africacarbonforum.com/

26-28 July 2013
Timber & Working With Wood Show-Sydney
Sydney, Australia
Contact: http://www.biztradeshows.com/visitor-registration.html?id=7510

30 July - 4 August 2013
Expomueble: Trade show of the furniture sector in Central America
Guatemala City, Guatemala
Contact: expomueble@agexport.org.gt; http://www.expomueblecentralamerica.com/

4-7 August 2013
21st International Wood Machining Seminar
Tsukuba, Japan
Contact: http://www.ffpri.affrc.go.jp/en/symposium/iwms21/

14-16 August 2013
APEC 2nd Ministers Responsible for Forestry Meeting
Cusco, Peru
Contact: http://www.apec.org/events-calendar.aspx

26-30 August
6th International Ecosystem Services Partnership Conference
Bali, Indonesia
Contact: http://www.espconference.org/ESP_Conference

27-30 August 2013
IV Mesoamerican Congress of Protected Areas
San Jose, Costa Rica
Contact: http://forests-l.iisd.org/events/iv-mesoamerican-congress-of-protected-areas/

11-13 September 2013
International Symposium on Tropical Forest Ecosystem Sciences (IUFRO)
Bintulu, Sarawak, Malaysia
Contact: Seca Gandaseca (seca@btu.upm.edu.my); www.btu.upm.edu.my/v3/index.php/ms/component/content/article?id=227

17-19 September 2013
Forests Africa: Opportunities for a Green Economy
Nairobi, Kenya
Contact: John.Prydz@unep.org; www.un-redd.org/Opportunities_for_a_GreenEconomy_Conference/tabid/106056/Default.aspx

24–27 September 2013
EFI 20 Years: Our forests in the 21st century – ready for risks and opportunities?
Nancy, France
Contact: http://www.efi.int/portal/efi20years/ac2013/

24-27 September 2013
9th Fair of machinery and products for the timber sector and 1st Amazon Fair
Belem, Para, Brazil
Contact: wrsp@wrsaopaulo.com.br; http://www.wrsaopaulo.com.br/index.php/eventos/feira-de-belem

25-26 September 2013
Lignofuels 2013
London, UK
Contact: http://www.wplgroup.com/aci/conferences/eu-eef4.asp

30 September 2013 - 4 October 2013
19th Session of the African Forestry and Wildlife Commission
Windhoek, Namibia
Contact: FAO Regional Office for Africa; foday.bojang@fao.org; http://www.fao.org/forestry/afwc/en/

7-9 October 2013
International Scientific Conference on Hardwood Processing (ISCHP) 2013
Florence, Italy
Contact: secretariat@ischp2013.org; http://www.ischp2013.org/home-page/

7-11 October 2013
3rd International Congress on Ecosystem Services in the Tropics
Medellin, Colombia
Contact: http://www.medellin.unal.edu.co/secosistemas/

7-11 October 2013
CIFOR Annual Meeting
Bogor, Indonesia
Contact: http://forests-l.iisd.org/events/cifor-annual-meeting/

7-11 October 2013
8th Meeting of the CBD Working Group on Article 8(j) and Related Provisions
Montreal, Canada
Contact: secretariat@cbd.int; http://forests-l.iisd.org/events/eighth-meeting-of-the-cbd-working-group-on-article-8j-and-related-provisions/

14-18 October 2013
37th Session of IPCC
Batumi, Georgia (tentative)
Contact: IPCC-Sec@wmo.int; http://www.ipcc.ch/scripts/_calendar_template.php?wg=8

14-18 October 2013
17th meeting, the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity (CBD)
Montreal, Canada
Contact: secretariat@cbd.int; http://forests-l.iisd.org/events/cbd-sbstta-17/

4-8 November 2013
25th Asia-Pacific Forestry Commission
New Zealand
Contact: http://www.fao.org/forestry/33587/en/

11-22 November 2013
19th Session of the Conference of the Parties to the UNFCCC
Warsaw, Poland
Contact: secretariat@unfccc.int; http://www.unfccc.int

20-21 November 2013
Bioenergy Commodity Trading 2013
Brussels, Belgium
Contact: http://www.wplgroup.com/aci/conferences/eu-eet3.asp

25-30 November 2013
49th Session of the International Tropical Timber Council and Associated Sessions of the Committees
Libreville, Gabon
Contact: itto@itto.int; www.itto.int

9-13 December 2013
Metsä 2013 - Joint Session of the 37th European Forestry Commission- 71st UNECE Committee on Forest and Forest Industry
Rovaniemi, Finland
Contact: http://www.unece.org/index.php?id=32311

3-7 February 2014
3rd meeting of the Intergovernmental Committee for the Nagoya Protocol (ICNP) on access and benefit-sharing (ABS) of the Convention on Biological Diversity (CBD)
Montreal, Canada (tentative)
Contact: secretariat@cbd.int; http://forests-l.iisd.org/events/icnp-3/

10-14 February 2014
World Congress on Agroforestry 2014
Delhi, India
Contact: http://www.wca2014.org/

23-27 June 2014
FAO Committee on Forestry - 22nd Session
Rome, Italy
Contact: peter.csoka@fao.org; http://www.fao.org/forestry/57758/en/

10-14 August 2014
World Conference on Timber Engineering
Quebec City, Canada
Contact: http://www.wcte2014.ca/, Email: wcte2014@agoracom.qc.ca

5-11 October 2014
XXIV IUFRO World Congress
Salt Lake City, USA
Contact: http://iufro2014.com/