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Flying under the radar?

Throughout the tropics, the wood sector provides hundreds of thousands of people with jobs, including in artisanal operations that can go unnoticed in official statistics but which are crucial employers in rural areas. In this edition of the *Tropical Forest Update*, Paolo Cerutti and co-authors (page 3) report that artisanal chainsaw millers in Côte d'Ivoire—mostly young people seeking to become financially independent—produce at least one-quarter of the country's domestic wood supply and probably much more; there is also substantial cross-border trade with neighbouring countries. Yet this part of the industry operates largely informally, lacking official monitoring, regulation and taxation and posing challenges for the sustainability of the sector and the resource on which it depends. Informality also means that government misses out on considerable revenue,

Inside: artisanal producers; fairtrade; medicinal plants; teak genetic conservation; more

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Cover image: Trucks loaded with artisanally produced sawnwood at Bouaké, Côte d'Ivoire, destined for Burkina Faso. *Photo: R. Tsanga & E. Essiane/CIFOR*

Image above: A farmer stands next to a one-year-old *Tetrapleura tetraptera* on his farm in Mprim-Ashanti Region, Ghana. *Photo: S.B. Samar/FORIG*

... Editorial continued

even though the operators themselves likely have to pay substantial "informal" taxes and fees. Cerutti and co-authors, whose research is part of an ITTO project in West and Central Africa, say there is a clear need for timber policies that bring the artisanal wood sector into formal economies in ways that both reduce informal costs in the sector and avoid imposing excessive formal taxes and other fees.

Small-scale operators are also the focus of an article by Pio Santiago and Mayra Espinoza (page 6), who report on the outcomes of an ITTO project that assisted indigenous communities in the Peruvian Amazon to tap into the fairtrade market. Fairtrade is a form of trade to encourage a voluntary, fair commercial relationship between producers and consumers. The Association for Integrated Research and Development (AIDER) worked with seven indigenous communities to certify their forest operations under the Forest Stewardship Council. Among other things, the project provided communities with training in various aspects of forest management, procedures for obtaining harvesting permits, wood processing and business management. The communities established an association, PROMACER, to promote sustainable forest management and certification, which joined forces with AIDER to create a third entity, Citeindigena SRL, with the aim of assisting community producers to gain access to markets for their certified wood products. The income of indigenous families involved in the project has already doubled, and local producers are ready to step further into the fairtrade market in the expectation that it will bring higher prices and ensure fair business dealings.

An article by Gloria Djaney Djagbletey and her co-authors (page 11) reports on an ITTO project in Ghana that has helped forest-fringe communities in three ecological zones—rainforests, semi-deciduous forests and the forest–savannah transition—develop conservation and sustainable-use strategies for medicinal plant species. Rural people in Ghana rely heavily on forest herbs, shrubs, lianas and trees as medicines for a wide range of ailments, but a combination of overexploitation and a lack of management poses a serious threat to the survival of such species. Participating communities were trained in seed collection and handling, nursery practices, medicinal home-gardening and plant domestication, and they carried out a range of conservation and production measures for valuable medicinal plants to ensure a sustainable supply. A next step will be to encourage communities throughout Ghana to adopt such practices.

The article by Yazar Minn and Reinhold Glauner (page 15) reports on an ex-post evaluation of an ITTO project in Myanmar. The project was completed in 2009 and the evaluation took place in 2016—enough time to indicate the sustainability of project outcomes. All the pilot teak seed production areas established under the project still exist and are being maintained, and another community has adopted the concept because of its capacity to generate revenue. A shortcoming of the original project design was that it had no formal link with policy development; nevertheless, there is potential to address teak genetic conservation in Myanmar's new forest policy now being drafted.

The article by Pradeepa Bholanath (page 19) describes an ITTO project in Guyana, declared complete in November 2016, that helped increase the professionalism of the country's wood-processing sector through training, the publication of revised timber grading rules to bring them into line with international standards, and awareness-raising. Among other things, the project helped increase wood recovery rates by 10%, and there has been similar growth in exports by small and medium-sized operators. The Guyana Forestry Commission is continuing some of the activities commenced under the project to assist the wood-processing sector to maintain its upward trajectory.

Wood processing and trade are important generators of employment in many tropical countries, but informal operators have been flying under the radar for long enough. If done well, bringing small-scale operations into the formal economy can have significant benefits for countries, communities, employees, forests and entrepreneurs. Maximizing the benefits for local people in such a process is imperative, and a major policy challenge.

Sub-Saharan Africa's invisible timber markets

Artisanal timber producers and traders fly largely under the radar in the region, and there is a clear need for policies and legal frameworks that incorporate their activities

by Paolo Omar Cerutti[1], Richard Eba'a Atyi[2], Edouard Essiane Mendoula[2], Davison Gumbo[3], Guillaume Lescuyer[4], Kaala Moombe[3], Raphael Tsanga[2] and Joanne Walker[4]

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Smoothing the way: Bringing artisanal enterprises into the formal timber sector could benefit countries, workers and forests. *Photo: T. Yanuariadi/ITTO*

Finding legal timber to supply the domestic market is a challenge in Côte d'Ivoire, a country in which forestry is the fourth-highest sector in export earnings. By law, a certain percentage of annual timber production must supply the local market, but the exact percentage has never been clarified. In practice it equates to 10–20% of industrial timber, according to official estimates (MINEF 2014), but this range falls substantially short of domestic demand.

Compounding the issue, industrial production has declined sharply in Côte d'Ivoire, while the country's domestic market, as well as those of neighbouring countries, have grown. Local farmers and non-industrial sawyers have filled the gap, selling trees felled in the preparation of fields or harvesting abandoned logs from the edges of logging operations, gazetted forests and fallows.

Côte d'Ivoire is not alone in this trend. Research by the Center for International Forestry Research (CIFOR) and partners in many countries in sub-Saharan Africa, Southeast Asia and Latin America has highlighted a similar pattern in domestic timber supply (Wit et al. 2010; Cerutti et al. 2014). The artisanal timber sector is thriving in sub-Saharan Africa, supplying millions of cubic metres of wood, fuelling cross-border timber trade, supporting hundreds of thousands of households and helping generate livelihoods.

According to most country and international data, however, this artisanal sector and the associated cross-border trade simply don't exist. Records are scant and incomplete, and there are few data or targeted regulations; the supply chain falls largely under the radar of official statistics. In some countries, including Côte d'Ivoire (where the non-industrial exploitation of forest resources is prohibited), the entire sector and those working in it are classed as illegal.

Research has begun to shed light on sub-Saharan Africa's domestic timber market. The recently completed ITTO project PD 700/13 Rev.2 (I) Phase I, Stage 1: "Development of intra-African trade and further processing in tropical timber and timber products", implemented by CIFOR, documented the processes, scale and impacts of the market in Côte d'Ivoire as well as the cross-border trade of timber with Côte d'Ivoire, Cameroon and the Democratic Republic of the Congo (DRC). Alongside earlier work by CIFOR, the research highlights the importance of this sector to local people, countries and the region as a whole.

Profitable, thriving and informal

Small-scale logging is an age-old activity in Côte d'Ivoire. It was banned in 2013, however, with the passing of laws designed to facilitate industrial-scale logging for export; similar bans have also been enacted in other countries in sub-Saharan Africa. The change in legal status has done little to quell the local consumption of artisanal timber in Côte d'Ivoire, however. Instead, the sector now operates informally, with thousands of people continuing to rely on it directly and indirectly for timber, employment and income. Our study indicates that artisanal chainsaw millers supply at least 27% of Côte d'Ivoire's domestic market—an estimated 1 million m^3 roundwood equivalent—although other data (e.g. Louppe & Ouattara 2013) suggest this could be a gross underestimate.

The economic benefits are widespread: the industry supports carpenters, cabinetmakers, wood sellers, transporters, loggers and others. Money also flows to those with authority at various points of the supply chain, with the informal imposition of administrative costs. Many small-scale sawyers are young people from both rural and urban areas anxious

to be financially independent; for such people, the most common reasons for joining the sector are income generation and employment. Most use their income to pay for food, housing and other daily household needs, and about 10% reinvest in cocoa, coffee and cashew plantations in their rural homelands.

Accessing trees is a constant challenge. Customary owners of forests may request sawyers to harvest logs, or give them permission to do so, but difficult arrangements mean that many sawyers turn to clandestine methods. If access is granted, the actual cost of the tree is low, particularly given the widely acknowledged scarcity of trees. This is likely due to a lack of knowledge in rural areas about the added value of sawnwood; moreover, customary owners often perceive that sawyers are doing them a favour by removing trees that interfere with crops—cocao plantations are considered to provide households with the best and most stable source of income.

Even after a timber source is secured, artisanal sawyers face several challenges. Prices and costs vary among sawyers (and between artisanal-sourced versus industrial-sourced sawnwood): those sawyers (about 73%) who work after receiving orders from, for example, a carpenter or trader tend to make larger profits than those who work without already-established buyers. This is partly because the former are better positioned to negotiate prices and partly because they are shielded from administrative hassles, given that transportation is generally taken care of by the buyer. Regardless of whether small-scale loggers have buyers, however, administrative hassles are the most common problem they report. These tend to occur during transportation and delivery to market and are managed through payments to local officials, a consequence of the informal nature of the industry and the reliance of so many on it for their livelihoods.

Our study estimated the total value of Côte d'Ivoire's domestic market sourced with artisanal timber at US$93 million, with industrial timber supply adding another US$250 million. The general criminalization of chainsaw milling under the ban, however, means that the forestry administration has little incentive to put in place either an adapted regulatory framework or a system to monitor the socioeconomic and environmental impacts of the artisanal sector, leaving this profitable sector to run itself.

Crossing borders

Domestic timber consumption captures only part of the story, with large volumes of artisanal timber also transported to neighbouring countries. Similarly to the in-country supply chain, the cross-border trade is largely undocumented or at least underreported.

The project monitored selected border posts in Cameroon, Côte d'Ivoire and DRC for several months. The volume of timber passing through each border post varied but, overall, the data and subsequent country estimates showed a consistent pattern across the three countries: far higher volumes of sawnwood were being traded across land borders

Cross-border boards: A truck loaded with artisanally produced sawnwood waits at Bouaké, Côte d'Ivoire, destined for Burkina Faso. *Photo: R. Tsanga & E. Essiane/CIFOR*

than shipped overseas. For example, DRC is estimated to export 120 000 m^3 of sawnwood across its southern and eastern borders (mainly through Uganda and Zambia) annually, which is nearly four times its estimated international sawnwood exports (de Wasseige et al. 2014). Chad is second only to China in the volume of timber it receives from Cameroon.

The volume of timber being traded across borders appears to be increasing, likely to meet the demand created by growing populations in sub-Saharan Africa and booming infrastructure development. But official records in the three countries fail to reflect what is happening on the ground. Even at border posts where records are kept, trucks are often loaded with far more wood than is recorded, and informally produced timber is mixed with industrially sourced timber, leading to the gross underestimation of actual timber production and trade.

The supervision of regional exports tends to fall under the responsibility of local administrations or even local communities, who sell standing timber to business people from neighbouring countries. The requirements and efficiency of formal trade vary between countries: in Côte d'Ivoire, for example, timber can be cleared across a border in 24 hours, whereas the official clearance procedure for moving products from DRC to Uganda and from Cameroon to Chad can take a week or more. At all the border posts monitored in our study, various informal arrangements exist alongside official procedures to simplify the export process, usually involving cash payments to customs officials and other parties with power. On the Cameroon–Nigeria border and the eastern and southern borders of DRC, informal direct payments to local officials are the norm and regular, formal taxation is the exception.

Integrating into the formal sector

The profitable and important artisanal timber industry operates outside official records and formal processes and therefore lacks sufficient monitoring and regulation of its financial, environmental, social and governance impacts. There is a clear need for adapted and improved timber policy frameworks that better incorporate artisanal

Seat at the table? There is a clear need for timber policy and legal frameworks that better incorporate artisanal domestic and regional timber trade in sub-Saharan Africa. *Photo: T. Yanuariadi/ITTO*

domestic and regional timber trade. Understanding the dynamics of artisanal timber production and trade, and using such knowledge to align policies with this thriving sector, can boost local livelihoods, sustainable forest management and national export income.

Technical and regulatory solutions exist for integrating informal domestic timber markets into the formal forest sector. For example, financial incentives could be granted to artisanal sawyers and traders for supplying the government with production and trade data, to which formal taxes could be applied. Artisanal sawyers and local timber traders are—first and foremost—entrepreneurs. They value simple processes, which may involve informal payments and bribes to enable the continuation of their operations. If technical and policy solutions add formal costs (e.g. in the form of taxation) without clear signs that public officials will reduce the number and amounts of informal payments required to stay in business, operators will resist integration into the formal economy.

These challenges are largely the responsibility of producer countries. We hope that the day will come when countries are less concerned about what happens within their borders than with what happens to forests at a larger scale (e.g. at the regional, landscape or ecoregional scale), but we are not yet there. The reality is that importer and consumer countries in sub-Saharan Africa (e.g. Burkina Faso, Chad, Kenya, Mali, Niger, Nigeria and Uganda) and beyond might express their concern about the negative socioeconomic and environmental impacts of timber production in neighbouring countries while also reaping the benefits of such trade—it fulfils their local timber demand, and most of the direct negative impacts are in the exporting countries. In this sense, innovative technical and policy solutions must be researched and tested at the supranational level to increase the benefits of intra-African timber trade and reduce its most persistent negative impacts.

Publications produced by the project can be found by inserting the project code (PD700/13 Rev.2 (I) Phase I Stage 1) into the ITTO project search function at http://www.itto.int/project_search.

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Fair progress towards fair trade

An ITTO project assisted indigenous communities in the Peruvian Amazon to produce certified value-added products for the fairtrade market

by Pio Santiago and Mayra Espinoza

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Chair bearers: The head of the Federation of Native Communities of Iparía, Sedequias Ancón (left), holds a chair with a community member, Carolina Barbaran Sedequias Ancón (second from left), a representative of the Peruvian government, María Pena Wong (second from right), and a representative of the Community Association of Producers of Certified Timber, Oscar Vásquez, in Pucallpa, Peru. The indigenous company Citeindigena is selling school furniture—made by indigenous communities using certified wood—through the government's MYPErú Purchasing Program. *Photo: M. Espinoza*

Fairtrade is an alternative form of trade promoted by certain non-government organizations, the United Nations and social and political movements with the aim of encouraging a voluntary and fair commercial relationship between producers and consumers. Fairtrade involves the certification of products by the fairtrade certification organization FLO-CERT, which was created to harmonize fairtrade product standards and certification requirements for small-scale community-based enterprises worldwide.

The fairtrade market does not require high production volumes, and it pays higher prices for timber originating from legal and sustainable sources; it represents, therefore, a real opportunity for communities in Peru with certified forests.

The project

The Association for Integrated Research and Development (*Asociación para la Investigación y Desarrollo Integral*—AIDER) is the forest regent of seven indigenous communities in the Peruvian Amazon that have obtained voluntary forest certification (VFC) for their forest management and chain-of-custody operations under the Forest Stewardship Council (FSC). The market for FSC-certified timber demands the same volumes and quality standards as ordinary markets, but the communities have difficulty in meeting such demands because their machinery has only low production capacity and they lack sufficient working capital to manage larger-scale production.

From 2013 to 2015, AIDER implemented ITTO project TFL-SPD 029/12 Rev.1 (M): "Marketing of timber from legal and sustainable sources by indigenous communities in Ucayali, Peru, for the fairtrade market", with technical and financial support from ITTO and in collaboration with the former Directorate of Forest and Wildlife Management (*Dirección de Gestión Forestal y Fauna Silvestre*—DGFFS, now the National Forest and Wildlife Service—*Servicio Nacional Forestal y de Fauna Silvestre*). The development objective of the project was to contribute to the sustainable production and legal trade of timber in the Peruvian Amazon by strengthening an inclusive forest governance system. Its specific objective was to enable the indigenous communities of Ucayali to improve their model for the marketing of timber from legal and sustainable sources by focusing on the fairtrade market.

Target beneficiaries

The main target beneficiaries of the project were seven communities of the Shipibo-Conibo indigenous peoples (Table 1, Figure 1) on the Ucayali River in the Callería, Masisea and Iparía districts in Coronel Portillo Province, eastern Peru.

Value-added timber production with chain of custody

The project helped the Buenos Aires community adapt its production to the FSC Principles and Criteria, and, in December 2014, Buenos Aires became the first of the target communities awarded VFC. Community members received training and technical assistance in various areas of forest production: forest inventory; the development and implementation of forest management plans to ensure compliance with authorized logging areas and volumes; procedures for obtaining forest harvesting permits; validation of the powers of community authorities; forest regulations; timber production; resawing techniques; natural wood drying and grading; and compliance with the FSC Principles and Criteria, among others.

Table 1: Indigenous community harvesting permits, Ucayali, Peru

Indigenous community	District	Scale of harvesting operation	Date of approval of most recent forest management plan	Permitted annual roundwood harvest (m^3)
Callería	Callería	Medium	20 May 2014	835
Junín Pablo	Masisea	Small	11 Mar 2015	452
Buenos Aires	Masisea	Small	22 Apr 2014	615
Roya	Iparía	Small	11 Nov 2014	554
Curiaca		Medium	Pending	0
Pueblo Nuevo del Caco		Medium	25 Feb 2015	1705
Nuevo Samaria		Medium	27 Apr 2009	1 867.6

The DGFFS in Ucayali approved the Buenos Aires community's forest management plan for small-scale timber harvesting in April 2014 based on the implementation of FSC standards and according to Peruvian laws, and the management plans of Callería, Roya, Pueblo Nuevo del Caco and Junín Pablo have also been approved. The Curiaca community is still developing its annual operating plan, and the Nuevo Samaria community's management plan was approved in 2009 and has not yet been updated. The five communities with recently approved forest management plans produced a total of 3 944 m^3 of roundwood in the period 2013–2015 (Table 2).

Strengthening the marketing structure of the indigenous company

The indigenous communities with VFC established the Community Association of Producers of Certified Timber (*Asociación Comunal de Productores de Madera Certificada*—PROMACER). PROMACER is a non-profit organization to promote sustainable forest management and certification in indigenous communities for the production of certified logs, sawnwood and processed goods and to help improve the quality of life of indigenous peoples.

Subsequently, AIDER and PROMACER joined forces to create the Indigenous Centre for Timber Processing and Technological Innovation (*Centro de Transformación e Innovación Tecnológica Indígena SRL*—Citeindigena SRL) to give continuity to the value chain of certified timber products and thus facilitate market access for them. The project updated the manual on stump-to-forest-gate chain-of-custody procedures produced by indigenous communities to enable timber-tracking all the way to Citeindigena SRL's processing plant. Citeindígena SRL's chain-of-custody procedures are now being applied, among other reasons to gain access to markets for certified timber products that require proof of legal origin.

Cutting edge: Directional felling is demonstrated to community foresters as part of the project. *Photo: AIDER*

Figure 1: Location of the target Shipibo-Conibo communities, Ucayali, Peru

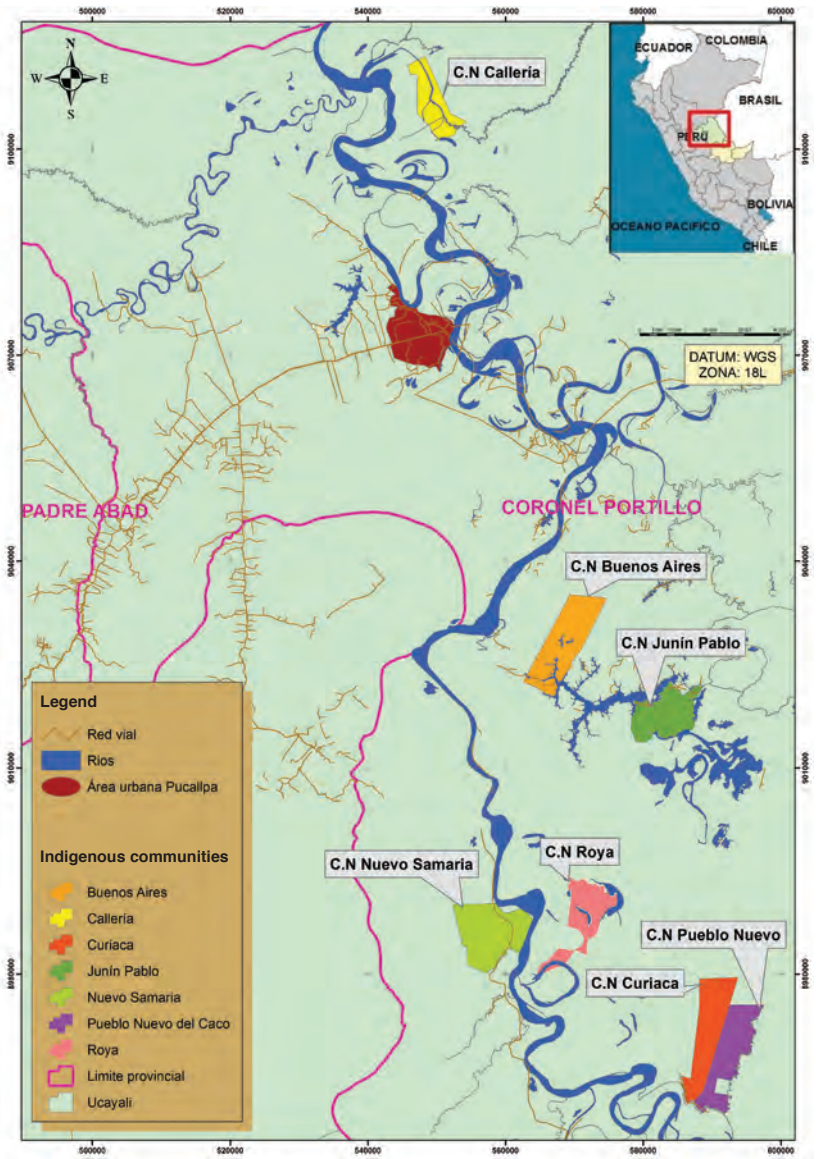
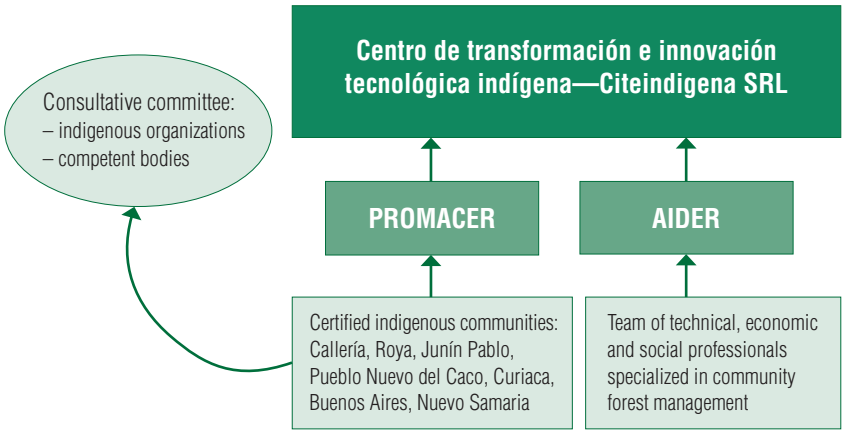


Table 2: Indigenous communities' timber production, Ucayali, Peru

Indigenous community	Species		Volume (m^3) of roundwood harvested	
	Common name	Scientific name	2013/2014	2014/2015*
Callería	Capirona	*Calycophyllum spruceanum*	700	100
Pueblo Nuevo del Caco	Cashimbo	*Cariniana domestica*	580	684.1
	Almendra	*Caryocar microcarpum*	0	26.1
	Cumala	*Virola sebifera*	61.4	0
	Cumala	*Virola spp.*	0	63.0
	Huayruro	*Ormosia sunkey*	0	188
	Marupa	*Simarouba amara*	44.0	74.0
	Mashonaste	*Clarisia racemosa*	0	14.1
	Moena	*Aniba spp.*	373	0
	Moena	*Aniba perutilis*	0	383
	Pashaco	*Schizolobium spp.*	0	37.6
	Shihuahuaco	*Dipteryx odorata*	138	152
	Quillobordon	*Aspidosperma subincanum*	61.6	21.6
	Yacushapana	*Terminalia oblonga*	0	62.1
Buenos Aires	Tornillo	*Cedrelinga cateniformis*	0	60.0
Junín Pablo	Marupa	*Simarouba amara*	0	20.0
	Cachimbo	*Cariniana domestica*	0	40.0
Roya	Capirona	*Calycophyllum spruceanum*	0	30.0
	Quinilla	*Manilkara bidentata*	0	30.0
Total			**1958**	**1985.6**

*Harvesting in 2014/2015 was up to May 2015.

Figure 2: Approach to adding value to timber production in the target communities



Citeindigena SRL is moving towards the supply of value-added and innovative timber products and, to this end, it has established partnerships with both public and private institutions. An important aspect of the company's operation is that a percentage of its profits is reinvested in machinery and equipment to ensure the sustainability of community forest management in PROMACER member communities.

Community leaders and the staff at the processing plant benefited from advisory services, technical assistance and ongoing support in dealing with the tax administration department (*Superintendencia de Administración Tributaria*) and in obtaining the necessary documentation, such as invoices, sales notes and waybills. The communities of Junín Pablo, Buenos Aires, Pueblo Nuevo and Curiaca all now have such documents.

Plane work: A worker produces planed lumber at the Citeindigena SRL processing plant. *Photo: AIDER*

Administrative and accounting procedures are in place at Citeindigena SRL, and company personnel are keeping tax and bookkeeping records to ensure smooth operation. The company is also implementing a business plan and an

Platters matter: These fruit plates were made using certified timber by Citeindigena SRL, a company co-owned by Shipibo-Conibo producers. *Photo: AIDER*

School delivery: School furniture supplied by Citeindigena SRL using certified wood from Shipibo-Conibo communities is handed over in a ceremony involving the then President of Peru, Ollanta Humala. *Photo: AIDER*

enterprise development and marketing plan. As a result of the technical assistance, Citeindigena SRL secured a contract for the first and second stages of the Peruvian Government's MYPErú Purchasing Program for the production of 500 school furniture modules (each module comprising a desk and chair). In the first stage, the company produced 250 modules using certified timber, and these were handed over at a ceremony attended by the President of Peru.

The project provided advice on the identification of products with high market demand, innovation in the development of such products, and the testing of prototypes in various pre-dimensioned timber lines (e.g. timber slats and strips), furniture and utility articles. It also helped AIDER develop an agreement with the national initiative on FSC VFC to support members of PROMACER and Citeindigena SRL in their efforts to supply certified products and thus promote the products of small-scale community producers.

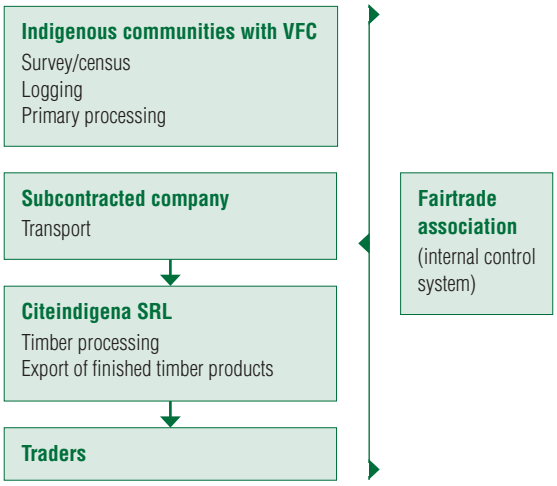
Towards a timber fairtrade-standard system

Fairtrade certification is a new concept for the men and women of the Shipibo-Conibo communities in Ucayali and for Citeindigena SRL, and the project has been instrumental in building understanding of it. As part of the process, the project organized an internship programme in Chile to enable community members to learn from the only other timber-related fairtrade programme in Latin America, which involves the Mapuche indigenous peoples as well as settlers and the private sector. Representatives of Citeindigena SRL, the chair of PROMACER and a female community leader participated in this internship programme.

Fairtrade model for Shipibo-Conibo communities

The project helped design a fairtrade model for timber-producing indigenous communities (Figure 3) involving four stakeholder groups: 1) VFC-certified indigenous communities implementing timber harvesting and primary processing operations; 2) the subcontracted company that provides river transport services; 3) Citeindigena SRL, which is responsible for the secondary (value-added) processing of timber and the export of fairtrade-labelled and certified timber products to international markets; and 4) timber traders. These groups intend to combine to set up a legally constituted fairtrade organization with its own statutes and regulations, to be operated by Citeindigena SRL. An internal control system will be established to coordinate actions aimed at ensuring compliance with the fairtrade standard. The price of fairtrade products will include a premium, to be set as a percentage of the sale of products to timber traders within the framework of the fairtrade system, and this revenue will be used to improve the overall capacity of the local fairtrade organization.

Figure 3: Proposed fairtrade model for indigenous communities



An independent consultant with experience in FSC certification has conducted a pre-audit test for fairtrade certification using the proposed model in order to assess compliance with the fairtrade standard and the work that needs to be done to achieve compliance. Citeindigena SRL and Fair Wood Connection SPA (a Chilean company) have signed a memorandum of understanding for the marketing of timber under the fairtrade standard, with Fair Wood Connection SPA identifying buyers.

A representative of the SSC America Group and Mapuche community members with fairtrade certification visited the Calleria community to observe its approach to forest management and VFC. Representatives of FSC Forest Certification–Peru and FSC International also participated in this internship initiative.

Project impacts

The project has had the following key impacts:

- Chain-of-custody procedures have been implemented in the target communities and in Citeindigena SRL.
- Indigenous community members now have knowledge of fairtrade procedures and a proposal for the implementation of the fairtrade standard.
- A community forest business model has been developed and validated, and its implementation will help improve forest governance in the region.
- Indigenous community authorities have greater capacity for forest management and timber production.
- Staff members of the indigenous company have improved their skills in all aspects of the operation of the processing plant, including administration, production and marketing.
- The income of indigenous families involved in the project has increased by up to 100%.
- Citeindigena SRL recently exported its first batch of certified timber (to the United States of America) in partnership with the company Madera Bozovich, involving a volume of 54 m² of shihuahuaco (*Dipteryx odorata*) lumber.

More information on ITTO project TFL-SPD 029/12 Rev.1 (M) can be obtained via ITTO's project search function (www.itto.int/project_search) by inserting the project number, and at AIDER's website (www.aider.com.pe/proyectos.html#).

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Restocking nature's medicine cabinet

An ITTO project piloted community approaches for arresting the loss of traditional medicinal plants in Ghana

by Gloria Djaney Djagbletey[1], Sparkler Brefo Samar, Akwasi Duah-Gyamfi, Emmanuel Asiedu-Opoku, Markfred Mensah, Jonathan Dabo and Jaquiline Joyce Twintoh

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Restock: Beneficiaries at Eteso in the Western Region of Ghana choose seedlings of medicinal plants for planting in dedicated plantations and set-aside secondary forests. *Photo: S.B. Samar/FORIG*

Globally, the demand for medicinal plants is increasing at a rate of 15–20% per year. The overall international trade in medicinal plants and their products was estimated at more than US$60 billion annually in 2000; at an average annual growth rate of 7% it would reach US$5 trillion by 2050 (Vasisht & Kumar 2002). In Ghana, up to three-quarters of the population depends on plant parts for health delivery (Adjei 2013). Such use is especially prevalent in rural communities, where poverty is widespread, there is little or no access to modern health-care facilities, and the cost of orthodox medicine is high. Interest in plants and plant-based drugs is also increasing in urban areas as people seek to avoid the potential health hazards and toxicity associated with some synthetic drugs.

The Ghana Health Policy specifies that all communities should be within 8 km of medical facilities, but this is far from realization. On the other hand, most rural communities are within 1 km of traditional medical practitioners (Kusi-Bempah 2011), who usually use plant parts such as roots, leaves, lianas and barks to treat disease.

The forest is a repository of medicinal plants comprising herbs, shrubs, lianas and trees, including important timber species such as *Khaya ivorensis*. Forest-fringe dwellers collect medicinal plants and sell them as raw materials to the manufacturers of traditional medical products in urban areas. Collectors operate their businesses in forest reserves and sacred groves without permits or guidelines from any agency and with no prescribed harvesting methods. The local extinction of some harvested species is a clear indication that the unregulated collection of wild plants for medicinal purposes poses a serious threat to the survival of potentially useful plants.

Hundreds of medicinal plant species occur in designated forest reserves, sanctuaries (e.g. sacred groves) and farmlands, but these habitats are under serious threat of degradation (Molnar et al. 2004; FAO 1997). Trees with known medicinal properties are harvested indiscriminately without replacement. Herbalists and collectors travel increasingly long distances and spend many hours searching for specific medicinal plants.

The situation has serious implications for rural health and livelihoods, and urgent action is needed to develop strategies that promote the sustainable production, use and conservation of medicinal plant species in general and threatened species in particular.

Healthy work: Community members tend a patch of land in the Offin Headwaters Forest Reserve under rehabilitation with indigenous plants of medicinal value as part of ITTO project PD 424/06 Rev. 2(F). *Photo: S.B. Samar/FORIG*

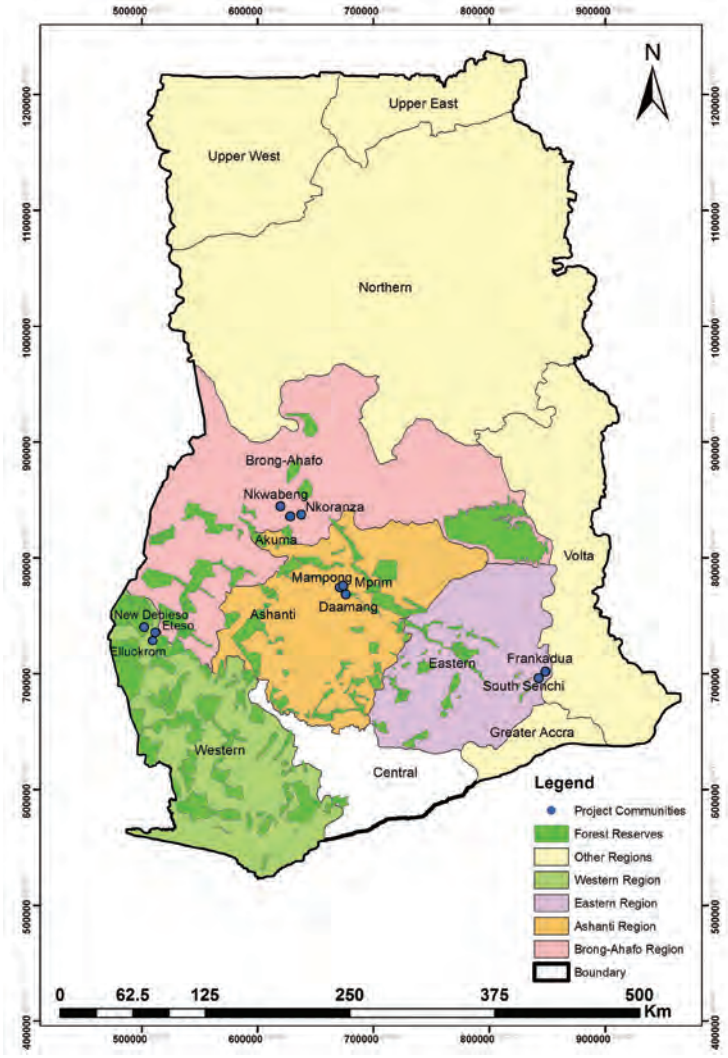
New approaches needed

The increasing scarcity of medicinal plants means the immediate loss of livelihoods for collectors and a rapid decline in the knowledge and efficacy of their use. A sustainable management approach is needed, not only because of the value of such plants as potential sources of new drugs but also because of the reliance of millions of rural dwellers on them for health care. Vulnerable habitats need *in situ* conservation, which can be achieved by training local herbalists and collectors in general nursery and field management of medicinal plant species, natural regeneration techniques and silvicultural practices (e.g. enrichment planting) for the reforestation of degraded habitats. But the natural stock alone will be insufficient to meet rising demand for medicinal plants. There is also a need, therefore, to train local communities in the domestication (*ex situ* conservation) of wild medicinal plant species, especially threatened species, in home gardens.

ITTO project PD 424/06 Rev. 2(F): "Conservation and utilization of medicinal plants in Ghanaian forest-fringe communities", which commenced in October 2008 and was declared complete at the 52nd session of the International Tropical Timber Council in November 2016, sought to develop conservation and sustainable-use strategies for medicinal plant species among forest-fringe communities in three ecological zones in Ghana. The project succeeded in motivating herbal practitioners, medicinal-plant collectors and selected communities to protect habitats and establish plantations of certain medicinal plants.

Under care: A farmer squats by a one-year-old *Terminalia superba* seedling on her farm in Nkoranza, Brong-Ahafo Region, Ghana. The seedling was planted with the assistance of ITTO project PD 424/06 Rev. 2(F) to increase the availability of medicinal plants in the area; it will also grow into a valuable timber tree. *Photo: S.B. Samar/FORIG*

Figure 1: Regions of Ghana and location of participating communities



Beneficiaries

The study was conducted in three ecological zones: rainforest; semi-deciduous forest; and the forest–savannah transition zone. The participating communities were Elluokrom, Eteso and New Debieso (Kumkumso) in the rainforest zone; Daamang, Frankadua, Mampong, Mprim and South Senchi in the semi-deciduous forest zone; and Akuma, Nkoranza and Nkwabeng in the forest–savannah transition zone (Figure 1). Table 1 shows the number of project participants in each of these communities.

Table 1: Communities and participants in ITTO project PD 424/06 Rev. 2(F)

Ecological zone	Community	No. of participants
Rainforest	Elluokrom	50
	Eteso	48
	New Debieso	50
Semi-deciduous forest	Daamang	8
	Frankadua	5
	Mampong	8
	Mprim	40
	South Senchi	15
Forest–savannah transition	Akuma	28
	Nkoranza	16
	Nkwabeng	22
Total	**11**	**290**

Table 2: The 20 most frequently used medicinal plants in the project areas, the parts used, and the ailments they are used to treat

No.	Scientific name	Local name	Parts used	Treatment
1	*Alstonia boonei*	Sinuro	Bark	Malaria; stomach disorders
			Leaves	Measles; waist and body pains; hernia
2	*Rauwolfia vomitoria*	Kakapenpen	Bark; roots; leaves; seeds	Jaundice; aphrodisiac; gonorrhoea; convulsions; yaws; hernia; bone dislocation; rheumatism
3	*Spiropetalum heterophyllum*	Ahomakyem	Stem; leaves	Spiritual protection; mental disorders
4	*Kigelia africana*	Nufutene	Fruits	Piles, constipation, Infertility
			Roots	Constipation
			Roots; fruits	Waist pain; sexual weakness
			Bark	Rheumatism; dysentery; wounds
5	*Spathodea campanulata*	Akuakuanesuo	Bark	Urethral inflammation; kidney trouble; gonorrhoea; swellings; skin diseases
6	*Bombax buonopozense*	Akonkodie	Bark	Diarrhoea
7	*Terminalia ivorensis*	Emire	Bark	Wounds; sores; cuts; ulcers; boils
8	*Alchornea cordifolia*	Gyama	Roots; bark; leaves	Jaundice; leprosy; snake bites; stomach ache for fever; rheumatic pains; sores; colds; bronchial troubles; dysentery; menstrual pain; headache; venereal disease
9	*Ricinodendron heudelotii*	Wama	Stem; bark; root-bark	Constipation; dysentery; elephantiasis; gonorrhoea; fever
10	*Khaya ivorensis*	Dubini	Bark	Stomach ache; cough; diarrhoea; dysentery; body pain; rheumatism
11	*Trichilia monadelpha*	Tanuro	Leaves; bark; roots	Arthritis; yaws; dyspepsia; sores; dysentery; ulcers; cough; skin ulcer
12	*Tetrapleura tetraptera*	Prekese	Bark	Gonorrhoea
13	*Milicia excelsa*	Odum	Roots; bark; leaves	Cough
14	*Pycnanthus angolensis*	Otie	Bark	Leprosy; stomach ache
			Leaves	Toothache
			Seed	Worms
15	*Dalbergia saxatilis*	Ahomabosom	Leaves	Drives evil spirits away
16	*Morinda lucida*	Konkroma	Roots; bark; leaves	Malaria; typhoid fever; gonorrhoea; bone fracture; rheumatism; candidiasis
17	*Citrus aurantifolia*	Ankaatware	Bark; leaves	Gonorrhoea; headache; fever; eye disease
18	*Zanthoxylum gilletii*	Okuo	Roots	Leprous spots
			Bark	Gonorrhoea; rheumatism
			Leaves	Aphrodisiac; stomach ache
19	*Okoubaka aubrevillei*	Odii	Bark	Leprosy; syphilis
20	*Paullinia pinnata*	Toantini	Roots; leaves; fruits	Bone fracture; waist pain; rheumatism

Project focus

The focus of the project was on documenting the distribution, availability, conservation methods, sustainability and supply of endangered and common medicinal plants in the three ecological zones. Medicinal plant species were identified and the mode and frequency of harvesting recorded. Consultative meetings and other interactions with community members were conducted to ascertain their use of identified medicinal plant species, and information obtained on the uses of plant species was validated using focus-group discussions. Participating communities were trained in the collection and handling of seeds and other propagation materials, best nursery practices and management, medicinal home-gardening, and plant domestication. Project beneficiaries were helped to establish plantations of medicinal plants, and training workshops were conducted on appropriate harvesting techniques.

Achievements

The project showed that plant medicine remains vital for many people in rural communities for the treatment of diseases such as infertility, piles, malaria, coughs, headaches and convulsions. The project identified, documented and validated (with herbarium samples) 394 medicinal plant species (both timber and non-timber) and their uses. Table 2 lists the 20 most frequently used species, although some (e.g. *Alstonia boonei, Milicia excelsa* and *Terminalia ivorensis*) are scarce in some parts of the country.

Curing: Project beneficiaries receive instruction on the drying of medicinal plant parts, Mprim-Ashanti Region, Ghana, under ITTO project PD 424/06 Rev. 2(F). *Photo: S.B. Samar/FORIG*

The project supplied more than 200 000 seedlings of frequently used but scarce plant species to farmers in the three ecological zones.

At all project sites, herbal practitioners were enthusiastic about and actively involved in establishing diverse plantations of medicinal plant species on their farms. In Nkoranza in the Brong-Ahafo Region, for example, community members planted two plots with more than 60 species of medicinal plants per hectare. Participating communities demarcated lands near sources of drinking water as conservation areas. The Mprim community delineated 12 hectares as a conservation area with the aim of restoring a significant proportion of medicinal plants and encouraging the regeneration of harvested high-value endangered medicinal plant species. Ten hectares of the degraded Offin-Headwaters Forest Reserve were replanted with indigenous timber species used for medicinal purposes by communities near the reserve.

The project boosted food security and biodiversity in the areas of influence. Through workshops organized at the CSIR-Forestry Research Institute of Ghana, participating traditional herbal practitioners and collectors were trained in silvicultural practices, nursery establishment and management, and appropriate harvesting techniques, and they received simple nursery tools. The provision of such incentives boosted the interest of participants in establishing their own private nurseries and medicinal plant gardens.

Conclusion

Plant medicines remain vital for many people in Ghana, and the project piloted approaches to the introduction and promotion of appropriate techniques for the *in situ* (in natural habitats) and *ex situ* (domestication in home gardens) conservation and sustainable management of medicinal plants by local communities. The project also provided an avenue by which communities can participate in the production of seedlings for the planting of priority medicinal trees while also improving their own access to traditional health products and boosting their livelihoods.

Publications produced by the project can be found by inserting the project code (PD424/06 Rev.2 (F)) into the ITTO project search function at www.itto.int/project_search.

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Conserving teak for future generations

An ex-post evaluation has found that an ITTO-supported project in Myanmar helped the conservation of high-quality teak genetic materials but would have benefited from more attention to social and policy aspects

by Yazar Minn[1] and Reinhold Glauner[2]

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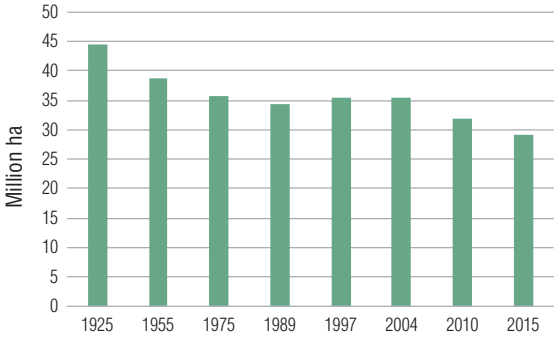
Review: A project officer and a district forest officer discuss "lessons learned" in a village-managed seed production area. *Photo: R. Glauner*

This article presents the results of an ex-post evaluation of an ITTO-supported project implemented in Myanmar to encourage the sustainable management of the country's teak resources. ITTO commissioned the ex-post evaluation in 2016 from a consortium composed of scientists and experts from the International Union of Forest Research Organizations, the Food and Agriculture Organization of the United Nations, and TEAKNET.

Sustainability of teak resources under threat

Myanmar is home to one of the world's most valuable commercial timber species, teak (*Tectona grandis* L.F.). The harvesting and processing of teak has contributed significantly to Myanmar's economic development, but the country's forest cover is declining: it is now at 43% of the total land area (29 million hectares), down from 66% (45 million hectares) about 90 years ago (Figure 1). The reasons for the decline are well known and include unsustainable logging, illegal harvesting, and the expansion of agricultural activities among local communities.

Figure 1: Myanmar's forest area, 1925–2015



Source: FAO (2015) and REDD Readiness Roadmap.

In the mid 1800s, the community use of teak forests in the country's Pegu area led Sir Dietrich Brandis—a German forester who was then the area's superintendent of forests—to conclude that the Karen communities could do better by applying the taungya system[1], a temporary agroforestry approach still widely practised today. This proved a major leap forward in the establishment of planted forests in the tropics under the concept of community forestry (as it is called today).

Despite a trend towards greater community involvement, however, reforestation has been unable to keep pace with deforestation, and valuable teak forest resources remain under threat. To address this issue, the Myanmar Forest Department implemented ITTO project PD 270/04 Rev.2 (F): "*Ex-situ* and *in-situ* conservation of teak (*Tectona grandis* L.F.) to support sustainable forest management" from 2006 to 2009. ITTO's financial contribution amounted to US$475 000, and the Government of Myanmar contributed 50 million Myanmar kyat in in-kind support.

Today, the Myanmar Forest Department is fully aware of the need for tree improvement and the systematic collection of quality seeds for the establishment of teak plantations. Despite a (time-limited) logging ban, Myanmar aims to maintain its market for high-quality teak wood and downstream products. It has embarked on a serious effort to control harvesting and ensure the legality of timber, and it has commenced a timber certification initiative.

[1] Taungya is a Myanmar word for "hill cultivation"; it describes the establishment of forest trees (here, teak) with agricultural crops such as upland rice and maize. Farmers maintain the areas until canopy closure and receive income from the agricultural crops or use them for subsistence. The government may also provide cash payments for maintaining the teak resource.

Re-covering: This landscape in Myanmar is to be reforested using taungya community forestry concepts. *Photo: R. Glauner*

Assessing project impacts

The ITTO teak conservation project operated throughout the country, implementing various activities in ten townships—Pyinmana, Paukkaung, Nattalin, Myan Aung, Saw, Kyauktaga, Pyay, Mawbe, Oktwin and Kantbalu. The project was intended as a precursor for a more sophisticated tree improvement programme; it involved the identification of plus-trees, the collection of seeds and clones for provenance trials, the establishment of hedge gardens, and the provision of support for tissue-culture laboratory facilities and operations to increase the production of superior plantlets. The project also encouraged the participation of local communities through village development, awareness-raising and capacity building—including workshops and study tours. It was expected that, after completion of the project, large quantities of high-quality seeds would be available from seed production areas (SPAs), and local communities would continue to benefit from the collection and sale of seeds.

The project had a two-fold development objective: 1) to promote the production of high-quality teak through genetic improvement in order to support sustainable forest management; and 2) to enhance national economic development through the sustainable production and export of high-quality teak using good-quality seeds for planting. Before the project, reforestation activities were carried out using seeds obtained mainly from unspecified seed sources; the project was expected, therefore, to address the country's extreme shortage of high-quality seeds for reforestation programmes.

The ex-post evaluation took place seven years after project completion and concentrated on the following aspects, which were the project's main focus:

- teak SPAs—established for seed collection and demonstration;
- a tissue-culture laboratory—for the production of high-quality tissue-cultured plantlets;
- hedge gardens, a nursery, and provenance trial plots—established for the production of quality plantlets and for the further establishment of seed orchards;
- the capacity of local communities—to enable their full participation in tending operations and the protection of SPAs; and
- the capacity of the staff of the Forest Department and Forest Research Institute—especially in handling, tree improvement and community development.

Findings and lessons learned

With the aim of establishing a solid foundation of information for the ex-post evaluation, the expert team conducted a large number of on-site inspections and held discussions with many project target groups, mainly local communities. The team visited six project sites (Pyinmana, Paukkaung, Saw, Mawbe, Oktwin and Kantbalu) and interviewed communities involved in seed collection operations in the SPAs. The team also met with the Myanmar Forest Certification Committee and timber companies and visited community forestry projects, where it held discussions with their representatives.

Sustainability of project sites

The team found that, seven years after project completion, all pilot sites established under the project still exist, and they are being maintained. These pilot sites are:

- SPAs in Kantbelu, Pyinmana, Saw, Paukkaung, Myan Aung and Nattalin (Figure 2);
- hedge gardens at the Forest Research Institute in Yezin in Pyinmana Township (0.04 hectares, 131 ramets with 22 clones) and at Letpankn, in Oaktwin (1.09 hectares, 932 ramets with 89 clones);
- provenance trials in the Ngalaik Reserve, Pyinmana Township (1.13 hectares, eight provenances) and in the Yenwe Reserve, Kyauktaga Township (1.29 hectares, nine provenances); and
- nurseries at the Forest Research Institute in Yezin and at the Central Forestry Development Training Centre in Hmawbi.

Silvicultural management of project sites

All plots underwent silvicultural treatment and maintenance. The team found, however, that clear objectives for treatments had sometimes been lacking. The project completion document, which reported on the final project findings (Forest Research Institute 2008), contains two good-quality technical chapters on how best to manage SPAs. The measurement component of these prescriptions was implemented, but subsequent analytical work has been weak, and information on mean or current increment, basal area and other parameters is unavailable. This weakness in analytical data-processing led to unfocused plot management.

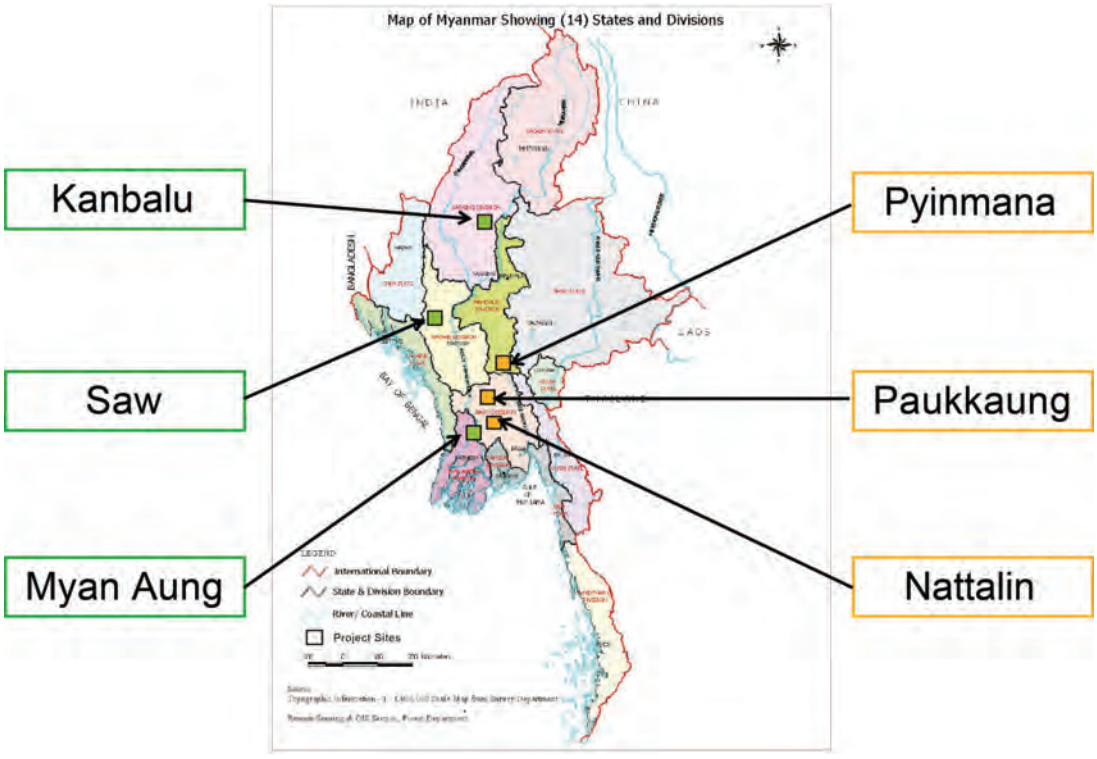
The team observed that plus-trees were perfectly shaped but had lower diameter growth compared with surrounding trees. Moreover, tree health and pests were not subject to field assessment, even though these are playing an increasing role in the management of teak forests. In particular, infestations of mistletoe fig pose a serious problem to tree vitality in some areas, and middle-aged stands appear to show very high mortality rates after infestation.

Practical application of seed production results

The long-term success of newly introduced technologies and forest management approaches requires—in addition to technical capacity—appropriate forest policy support. The ex-post evaluation found that, in this project, the objectives and anticipated outputs focused exclusively on technology. Links to forest policy were not envisaged; in hindsight, this is a major shortcoming of the project design, and it means that SPAs and gene conservation areas are not integrated into a wider reforestation or sustainable forest management approach. Because tree improvement was not embedded in the forest policy framework, important project findings and results have not received the attention they require, with the following results:

- In teak plantation establishment, no distinction is made between seeds/seedlings from SPAs or clonal propagation, compared with natural origin.
- Growth performance indicators are lacking in SPAs and at sites established with seeds of natural origin.
- Cloned or vegetatively propagated material is not systematically tested in plantation areas.

Figure 2: Pilot sites for seed production sites developed under the project



Fine specimens: Teak plus-trees in a seed production area in Myanmar. *Photo: R. Glauner*

- The criteria for SPAs and plus-tree selection are not re-evaluated periodically.
- Some key results at project sites—such as provenance trials—are unavailable, and therefore the anticipated scaling up of seed production has not taken place.

Long-term project impact

By design, the project was intended to produce, through short-term measures, primarily long-term impacts in the *ex situ* and *in situ* genetic conservation of teak. Project measures were implemented successfully; all established plots still exist and are subject to regular maintenance. Despite these successes, however, the achievement of the project's long-term objectives is not guaranteed. There will only be a lasting and measurable impact if high-quality seeds (e.g. from the project's SPAs) are used in teak planting projects. Making the use of high-quality teak tree seedlings mandatory through Myanmar Forestry Department regulations is essential for ensuring the project's long-term impact. The evaluators consider that the forest policy currently being drafted could provide a valuable avenue towards this end.

The impact of the project on local communities participating in the project and those adopting project-tested approaches has been mixed. Some communities have selected and marketed seeds successfully and are protecting their SPAs very well. Other communities have abandoned their silvicultural maintenance entirely because of a lack of seed production from their SPAs. One community visited by the evaluation team in Kin Mon Taung Reserved Forest, Taungdwingyi, adopted the concept, even though it was not a target community under the project. There, seed production and marketing contributes considerably to community income; the community even employs a guard to secure the area. The community is somewhat reluctant to implement the planned silvicultural treatments, however, for fear that this will reduce income.

Conclusion

Tree improvement and the genetic conservation of *Tectona grandis*, one of the world's most valuable tropical timber species, is a long-term goal of tremendous importance, especially because natural forests are dwindling at alarming rates and reforestation is not keeping pace with degradation. Providing support for technical-oriented approaches is an excellent way to advance forestry and build up knowledge and capacity, both of which are indispensable in Myanmar for managing the transition from forest exploitation to sustainable forest management for and by communities and society. Sustainable management cannot be achieved by technical guidelines alone, however: the integration of all forest users, and greater political awareness of the need for change, are equally necessary.

ITTO project PD 270/04 Rev.2 (F) was an excellent example of the success that can be achieved with good planning and dedicated implementation. To evaluate the long-term impacts of this technical project on the target communities and policy development, however, the inclusion of measurable social and policy indicators would have been beneficial; greater attention to these aspects would have helped advance the development of a strong seed-supply system for high-quality teak planting material in Myanmar.

Publications produced be the project can be found by inserting the project code (PD270/04 Rev.2 (F)) into the ITTO project search function at www.itto.int/project_search.

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Boosting wood processing in Guyana

An ITTO project has helped bring a new level of professionalism to the country's wood-processing subsector

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Guide on guiding: Instructors demonstrate the use of guides in chainsaw milling to increase wood recovery. *Photo: P. Bholanath/GFC*

Guyana's forest sector is focused on primary production, and in the past little attention has been paid to downstream value-adding, largely because of a lack of industry capacity to move up the value-adding chain. A comprehensive and integrated programme to develop Guyana's wood-processing subsector is essential for the efficient and sustainable use of forest resources.

The Government of Guyana is implementing its Green State Development Strategy, as informed by the following policy documents (among others): Low Carbon Development Strategy (2009); Forest Act (2009); National Forest Policy Statement (2011); and National Forest Plan (2011). A key element of the plan is to promote increased wood processing as a means of obtaining more benefit from forest use while also helping reduce deforestation and forest degradation by encouraging sustainable forest management.

Project to strengthen wood processing

Capacity building and supportive policies along the wood-processing value chain will encourage the more efficient and sustainable use of forest resources, thereby reducing wastage and pressure on the environment, while also maximizing the market potential of Guyana's wood products.

The approach was boosted by the development of the Code of Practice for Wood Processing (Sawmills and Lumberyards) under a project implemented by the Guyana Forestry Commission (GFC) with funding from ITTO[1] from April 2010 to November 2012, and—as described in this article—by another ITTO project (PD 687/13 Rev.1 (I))[2] implemented by the GFC from June 2014 to November 2016. The aims of the latter were to build the capacity of managers, operators and regulators in the wood-processing subsector to improve sustainability, efficiency and competitiveness and to enhance the national system for inspection and certification to facilitate local sales and exports of lumber. The project's specific objective was to strengthen the performance of the wood-processing subsector by building local capacity and developing a national system for promoting and facilitating the efficient trade and use of lumber for local and export markets.

Project outcomes

ITTO project PD 687/13 Rev.1 (I) had three main outputs:

1) the training of 320 personnel—managers, supervisors, operators and regulators—in the wood-processing subsector in 26 aspects of lumberyard and sawmill management (Table 1);

2) a review of the national (domestic and export) lumber trade, and publication of a revised version of the Guyana Timber Grading Rules and quality/dimensional standards for lumber to be used in the construction sector; and

3) increased awareness among timber users (contractors, architects and value-added operations).

The revision of Guyana's timber grading rules addressed international requirements for timber grading and updated the rules based on local developments. Timber grading is fundamentally a marketing tool to ensure that buyers are able to order products of given quality with defined specifications and the sellers can supply such products. Grading can be done either visually—based on certain size characteristics and the occurrence of visual defects such as knots—or by machines used to test timber strength. The revision of the grading rules was much-needed in Guyana, and the rules are now simpler and therefore easier to apply for graders,

1 ITTO project PD 513/08 Rev.1 (I).

2 The project title was: "Strengthening the performance of the wood-processing sector in Guyana, through building local capacity and enhancing national systems that promote forest product trade and sustainable utilization of forest resources".

Table 1: Training courses in aspects of lumberyard and sawmill management and regulation provided by ITTO project PD 687/13 Rev.1 (I), for four categories of trainees

	Description	Category			
		Sawmill/lumberyard managers/supervisors	Sawmill operators	Lumberyard operators	Regulators
		1 day	5 days	5 days	3 days
1	Timber and its properties	◊	◊	◊	◊
2	Legal framework for sawmills, lumberyards	◊	◊	◊	◊
3	Overview of sawmilling process	◊	◊	◊	◊
4	Occupational safety and health in wood-processing operations	◊	◊	◊	◊
5	Sawmill components I: Headrigs		◊		◊
6	Sawmill layout II: Edgers, trim and cut-off saws, etc.		◊		
7	Sawmill components III: Power and transmission equipment		◊		
8	Sawmill components IV: Dogs, log turners, conveyor systems, etc.		◊		
9	Sawmill site layout	◊	◊		◊
10	Sawmill (internal) layout	◊	◊		◊
11	Lumberyard site layout	◊	◊	◊	◊
12	Lumberyard (internal) layout	◊	◊	◊	◊
13	Care and maintenance of saws		◊	◊	
14	Pre-milling operations	◊	◊	◊	◊
15	Mill operations	◊	◊	◊	◊
16	Post-milling operations I: Sorting, grading, storage of lumber		◊	◊	◊
17	Post milling operations II: Kiln drying, air drying, end seal treatment		◊	◊	
18	Post milling operations III: Wood preservation		◊	◊	
19	Post milling operations IV: Sorting, grading, bundling		◊	◊	◊
20	Useful tools, equipment for sawmills, lumberyards		◊	◊	◊
21	Factory/lumberyard hygiene (light, dust, noise management)		◊	◊	◊
22	Recommended admin practices	◊	◊	◊	◊
23	Marketing issues	◊	◊	◊	◊
24	Training for sawmilling, lumberyard operatives	◊	◊	◊	◊
25	Introduction to timber grading		◊	◊	◊
26	GFC's Code of Practice for Wood Processing (Sawmills and Lumberyards)		◊	◊	◊

exporters and buyers. The revised rules are also more aligned with those of destination markets, especially the United States of America, the European Union and Caribbean countries.

Beneficiaries

Direct and indirect project beneficiaries include the following:

- *Sawmill/lumberyard owners and operators*: training and capacity-building activities have enabled producers and manufacturers to more efficiently process timber, producing lumber of a higher standard and quality with higher recoveries and at a lower cost per unit.
- *Exporters of lumber and wood consumers in the value-added and construction sectors*: personnel are more aware of the need to use wood efficiently, thereby assisting them in making informed purchasing decisions. Marketing and promotional information have been placed strategically at points of purchase to further assist this process.
- *Government officials in the GFC, Guyana's Environmental Protection Agency and the Guyana Ministry of Labour*: the project assisted the value-adding wood-processing subsector to operate in a more structured and efficient way. Government personnel participated in the capacity building and training and are now better able to achieve their mandates.

Overall, the project helped strengthen the wood-processing subsector, enabling it to make more efficient and sustainable use of the nation's forest resources. There has been an increase in wood recovery rates (by up to 10%) and greater alignment with export standards between Guyana and timber consumer countries. Based on GFC's statistics, exports by small and medium-sized operators have increased by as much at 10%.

Gun barrel straight: Certified dressed bullet wood (*Manilkara bidentata*) sawnwood, graded for export. *Photo: www.ecosdelbosque.com*

Challenges and lessons

An important aspect of the project design was its integration with a related project (ITTO project PD 513/08 Rev.1 (I)). The interaction of the two projects created greater benefits for the national economy and sustainable forest management than likely would have been achieved separately.

Improving intersectoral linkages was another important aspect of the project strategy. The approach succeeded in increasing collaboration between associations representing loggers, exporters, sawmill and lumberyard owners, and companies involved in value-added production. There is now greater understanding that all major stakeholders need to work together to improve the quality of forest products and to ensure that the forest resource is used efficiently and sustainably.

A collaborative mechanism developed during project implementation involving all relevant parties ensured that the revised Guyana Timber Grading Rules are acceptable to all stakeholders. For example, two key sectoral organizations—the Forest Products Association and the Guyana Manufacturers and Services Association—participated in the revision, and their involvement also assisted in the effective sharing of project results.

The ongoing engagement of stakeholders during project implementation—not only through consultation and awareness-raising sessions, but also capacity building and training—was essential. ITTO project PD 687/13 Rev.1 (I) did both, and the engagement process played an important role in project success by enabling managers, technicians and operators to buy into proposed changes, providing them with practical demonstrations and enabling them to see the benefits of implementing such changes.

For the wood-processing subsector to be competitive, there is an ongoing need to train wood processors and exporters in: timber grading and market requirements; the cost of production; quality assurance; waste management; occupational health and safety; and social responsibility.

Sustainability of project outcomes

In the wake of the project, there is more optimism in the wood-processing subsector about its capacity to be competitive and profitable. Operators have higher levels of efficiency, and there is more alignment between Guyana's export standards and the standards of the main consumer countries.

Feedback from the primary wood-processing subsector indicates that the implementation of practices set out in the Code of Practice for Wood Processing has led to improvements in recovery rates and product quality, and the revised Guyana Timber Grading Rules will boost exports because of improved uniformity and greater conformity with international standards.

Stakeholder participation in the management of the project and its activities was overwhelming and crucial for its success. It led to instant buy-in to proposed changes among stakeholders, who were able to assess the benefits they would obtain by implementing the practices proposed in

Links in the chain: Forest workers receive training in chainsaw maintenance under ITTO project PD 687/13 Rev.1 (I) as part of efforts to increase the sustainability, efficiency and competitiveness of Guyana's wood-processing subsector. *Photo: P. Bholanath/GFC*

the revised Guyana Timber Grading Rules. The strategy of obtaining ongoing feedback and having open discussions undoubtedly increased acceptance, too.

The project strategy was clear in the problems it was addressing and how the specific objective would be achieved. Stakeholders were able to increase recovery and value by making relatively small adjustments in their practices without substantive capital investment.

The sustainability of project activities after project completion is assured because of the following factors:

- The GFC will continue certain activities commenced under the project as part of its annual work programme and budget to ensure the smooth operation of the national lumber trade.
- The Forest Products Development and Marketing Council will work closely with the GFC to disseminate information for wood purchasers and users through the network and communication mechanism established under the project, including with point-of-sale posters.
- Ongoing training for the wood-processing subsector will be delivered through the Forestry Training Centre Inc., making use of training manuals developed under the project and ensuring that all personnel are able to meet the requirements of the Code of Practice for Wood Processing.

Publications produced by the project can be found by inserting the project code (PD687/13 Rev.1 (I)) into the ITTO project search function at www.itto.int/project_search.

Fellowship report

An ITTO Fellow has modelled the growth rates of two commercially important timber species in Nicaragua by measuring growth rings obtained from wood cores of standing trees

by Darwin Rolando Paguada Pérez

Tropical Agricultural Research and Higher Education Center (CATIE)
Turrialba, Costa Rica

Drilling in: An assistant extracts a core wood sample from a *Carapa guianensis* tree in the North Caribbean Autonomous Region, Nicaragua. *Photo: D.R. Paguada Pérez*

The aim of this study, which was funded by an ITTO Fellowship, was to contribute to the sustainable management of *Swietenia macrophylla* (mahogany or caoba) and *Carapa guianensis* (cedro macho) forest populations in the North Caribbean Autonomous Region (*Región Autónoma del Caribe Norte*—RACN) in Nicaragua, using a dendroecological approach to assess their growth patterns in relation to climatic variables. At present, Nicaragua uses a "minimum diameter" approach to determining the felling cycles of *Swietenia macrophylla* and *Carapa guianensis*, but this is not necessarily based on actual growth rates. My study:

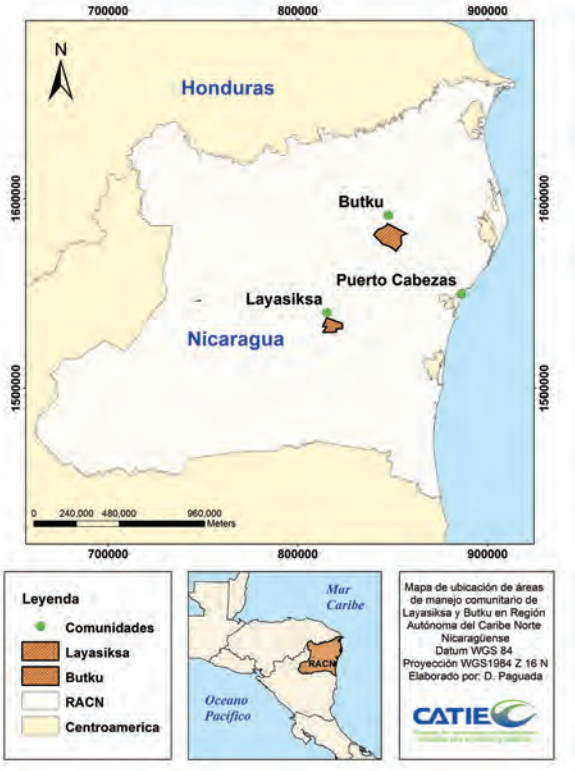
- assessed the annual nature of growth rings for *Swietenia macrophylla* and *Carapa guianensis* in the study area;
- analysed the annual diameter growth patterns of populations of the two species in relation to climatic factors; and
- proposed harvesting guidelines for the sustainable forest management of *Swietenia macrophylla* and *Carapa guianensis* based on a growth model adjusted according to annual diameter increment data obtained by measuring growth rings.

Study area, target species and methodology

The fieldwork for the study was conducted in the Layasiksa and Butku communities in the RACN (Figure 1), where community forestry areas have been designated for use by the traditional owners.

Swietenia macrophylla and *Carapa guianensis* were selected for study because of their commercial value and the high rate of harvesting among Miskita indigenous communities in the

Figure 1: The location of the study sites in indigenous communities in the North Caribbean Autonomous Region, Nicaragua



RACN (WWF 2003, 2004; Pacheco et al. 2008); both species are considered overexploited (Cordero & Boshier 2003). The two species also exhibit climatic variations in their growth rings (Dünisch et al. 2003), and both are distributed throughout the RACN (Cordero et al. 2003).

Table 1: Number of trees surveyed, including tree core samples, in two communities

Species	Community	No. of trees sampled	Total no. of tree core samples
Swietenia macrophilla	Layasiksa	18	36
Carapa guianensis	Layasiksa	22	44
Carapa guianensis	Butkus	20	40
Total		**60**	**120**

Swietenia macrophylla and *Carapa guianensis* trees were identified in designated community forestry areas using the tree scanning methodology suggested by Gallego and Finegan (2004) for dispersed trees. All selected trees were labelled and measured, with data collected on parameters such as diameter at breast height (dbh), height, sociological position and elevation. Soil samples were also collected using the protocol established by Sesnie et al. (2009), and two core samples per tree were obtained using a 10-mm Pressler borer; Table 1 summarizes the number of trees and cores involved in the study.

Preparation of core samples, laboratory analysis and growth models

The tree cores were dried, mounted, sanded and digitalized using a high-resolution scanner. Growth rings were measured using Image-Pro Plus software (version 4.0) for Windows. To synchronize the core measurement series and assign calendar dates to the chronological series, growth patterns were plotted in skeleton plots. COFECHA software was used for quality control in the dating and measurement procedures, and correlated growth-ring series were obtained for each species. Finally, the synchronized series was run through ARSTAN software to estimate and assess ring width index values and chronologies, which were subsequently correlated with climatic variables. Age/diameter (growth) models were developed by adjusting a sigmoid function using the diameter as an independent variable (Schöngart et al. 2007; Imaña & Encinas 2008).

Growth modelling for the target species

Based on the diameter increments adjusted through the Gompertz sigmoid model, it is possible to assess the current annual increment (CAI) and the mean annual increment (MAI). The CAI is the difference between the annual diameter increments recorded in the first and second years, and the MAI is the mean diameter growth over given age intervals.

The aim of modelling cumulative dbh growth together with CAI and MAI values is to establish the biological rotation age of trees and their felling cycle. Figure 2 shows cumulative dbh values in the Gompertz sigmoid model with CAI and MAI values.

Focused: The author examines a wood core taken from a specimen of *Swietenia macrophylla* in the North Caribbean Autonomous Region, Nicaragua. *Photo: D.R. Paguada Pérez*

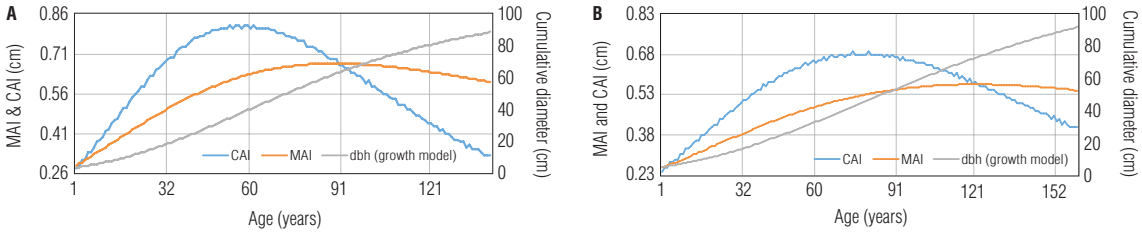
Results

Analyses confirmed the annual nature of *Swietenia macrophylla* and *Carapa guianensis* growth rings, as suggested by Devall et al. (1995), Bauch and Dünisch (2000), Dünisch et al. (2003), Roig and Zevallos Pollito (2009) and Grogan et al. (2014). The growth model showed an MAI of 5.8 mm in stem diameter for *Swietenia macrophylla*, with the highest value over the felling cycle of 6.6 cm. For *Carapa guianensis*, the MAI was estimated at 4.8 mm, and the highest value over the felling cycle was 5.4 cm.

The modelling of diameter increment patterns indicated a felling cycle for *Swietenia macrophylla* of 61–89 years to enable trees of this species to reach a harvestable dbh of 40–65 cm. The felling cycle for *Carapa guianensis* was calculated at 80–122 years to enable trees of this species to reach a harvestable dbh of 40–75 cm.

Layasiksa and Butku have similar climatic conditions, with a mean annual temperatures of 26 °C, considered within the range suitable for both target species (Barrance et al. 2003). It is generally accepted that precipitation levels can be a limiting factor in the growth of both species, as described by Rozendaal and Zuidema (2011) for *Swietenia macrophylla* and by Bernal (2013) for *Carapa guianensis*. Overall, however, no significant correlations were found to indicate that rainfall or temperature had any bearing on tree diameter increments, probably due to the short duration of the annual dry season.

Figure 2: CAI, MAI and dbh (according to the growth model) for (A) *Swietenia macrophylla* and (B) *Carapa guianensis*



Conclusion and recommendations

Growth modelling based on the measurement of growth rings and growth patterns—which can be applied to any forest community after an annual periodicity analysis—can generate immediate knowledge to facilitate decision-making, for example by assisting in planning forest operations and enabling accurate estimates of economic returns over time for given species and forests. *Swietenia macrophylla* and *Carapa guianensis* have annual growth rings, which makes it possible to model the diameter growth of these species and its relationship with the age of trees as a basis for better forest management planning.

The models developed in this study show discrepancies in the rotation periods estimated on the basis of biological criteria and those calculated on the basis of minimum cutting diameters established by technical standards. It is noteworthy that the minimum cutting diameter of 40 cm established by Nicaraguan technical standards for *Carapa guianensis* is lower than the diameter values considered appropriate for harvesting according to biological criteria. On the other hand, the minimum cutting diameter of 50 cm established for *Swietenia macrophylla* is within the range estimated to be biologically desirable.

It is recommended that the Government of Nicaragua update guidelines and standards for the sustainable management of these community forests, using a polycyclic silvicultural system with felling cycle projections based on the growth models developed in this study. To ensure better planning in the harvesting of the two species, commercial surveys should include the sampling and georeferencing of future crop trees, preferably with dbh >30 cm. Such data, together with the MAI models developed in this study, would enable more accurate projections of harvestable volumes for both species in the future.

Acknowledgements

The author thanks the Miskita communities of Layasiksa and Butku for facilitating his stay and data collection. The author is grateful to ITTO for its support through the ITTO Fellowship Programme, which has enabled him to continue his PhD programme at the University of Costa Rica.

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International Conference on Sustainable Mangrove Ecosystems

18–21 April 2017, Bali, Indonesia

Sustainable fisheries: mangroves sustain local fisheries in Bintan Island, Indonesia.
Photo: Indonesia's Ministry of Forestry

Managing a vital resource for achieving the SDGs and the Paris Agreement

Mangroves are among the world's most productive ecosystems, producing a wide range of goods and environmental services. If sustainably managed, they can support the livelihoods of millions of coastal-dwelling people while storing globally significant quantities of carbon. But the area of mangrove forests is decreasing in many countries due to poor management and rapid development.

The International Conference on Sustainable Mangrove Ecosystems will draw on lessons learned in the implementation of a range of mangrove initiatives and projects in the tropics to showcase best practices in the conservation, restoration and sustainable use of mangrove forests. It will identify ways in which sustainably managed mangrove ecosystems can help in achieving the Sustainable Development Goals and the Paris Agreement on climate change.

The conference is co-organized by ITTO, Indonesia's Ministry of Environment and Forestry, and the International Society for Mangrove Ecosystems (ISME).

More information: www.itto.int/mangrove2017

ITTO

ISME
International Society for Mangrove Ecosystems

Market trends

Welcome to the new era of change and uncertainty

by Mike Adams

Compiled from reports of ITTO's Market Information Service

Although the two big political events of 2016 were undoubtedly "Brexit" and the ascension of Donald Trump to the presidency of the United States (US), timber markets worldwide have also been rocked by two other major changes. One of these is the protectionist stance adopted by the US government, with a proposal for a 20% import duty on goods from Mexico riling importers and retailers to the extent that they have created an action group. The other is the banning, by the Chinese government, of harvesting in China's natural forests, creating a supply black hole that can only be filled by imports. Against this backdrop, there is a high level of uncertainty about market prospects in the year ahead.

European Union

The decision by the United Kingdom (UK) to leave the European Union (EU)—generally dubbed Brexit—in a referendum in June 2016 shook currency markets worldwide, and the value of the British pound plunged. There was an immediate economic reaction to the uncertainty caused by the vote, and UK businesses reeled from the shock. For UK timber importers, the weakening of the pound to a 30-year low against the US dollar in the wake of the referendum, and tumbling stock market valuations for UK house builders, combined to undermine sentiment.

Actors in the tropical wood sector initially thought Brexit would have a significant and lasting impact on the UK's tropical timber imports. The UK was the largest importer of tropical timber in the EU in 2016, accounting for around 25% of all EU tropical wood product imports (in comparison, France, the second-largest EU market for tropical timber, accounted for about 15%). Until the two-year process of leaving the EU is completed, however, all EU laws, including the EU Timber Regulation (EUTR), will remain in force in the UK, and the implementation of EUTR in remaining EU countries will not be affected.

All indications are that the UK will continue to coordinate enforcement approaches with the EU, similarly to the way in which non-EU European countries Norway and Switzerland have been doing, alongside the US, Canada and Australia. These countries and the EU are part of an informal process known as the Timber Regulation Enforcement Exchange, "TREE", the aim of which is to support the robust and consistent enforcement of demand-side timber regulations by providing a forum for officials from participating countries to exchange information on high- and low-risk timber flows entering their countries.

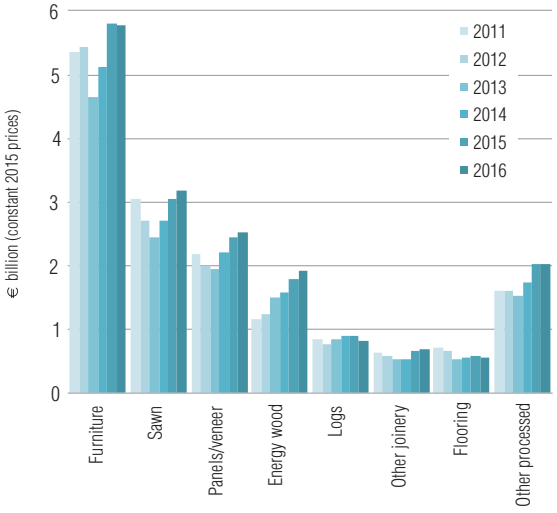
Forecasting the European construction market has always been complex because of the many players in the region. Nevertheless, the market is seeing steady growth (coinciding with increasing gross domestic product in almost all EU countries since 2014), which is good news for tropical timber exporters. Manufacturing activity and economic sentiment in the EU increased to their highest levels since 2011 in the closing months of 2016; by the end of the year, unemployment in the 19-nation eurozone had fallen to its lowest point in more than seven years. The burning question in Europe is whether populist politics will overtake this fragile economic growth, thereby threatening the future of both the euro and the European single market.

EU imports

There were declines in EU imports from tropical countries in 2016 for wood furniture (by 2.2%, to €1.52 billion), sawnwood and decking (by 1.9%, to €1.01 billion), woodfuel (by 2.9%, to €138.9 million), flooring (by 20.3%, to €76.4 million), and logs (by 4.2%, to €73.8 million). These falls were partly offset by rising EU imports from tropical countries of plywood and veneer, up by 9.5% (to €44.4 million), and of other joinery (mainly laminated veneer lumber—LVL—and doors), up by 3.2% (to €263 million).

After rapid growth in 2015 and the first quarter of 2016, EU imports from Indonesia (dominated by decking, doors, plywood and LVL) stabilized in 2016. Imports from Malaysia (mainly sawnwood, plywood, doors and LVL) peaked in May 2016 and fell towards the end of the year. Imports from Cameroon (mostly sawnwood) and Gabon (a mix of sawnwood, veneer and plywood) continued to rise in 2016. Figure 1 depicts the main trends in EU imports of tropical wood products in the period 2011–2016.

Figure 1: EU imports of tropical wood, by product group, 2011–2016



Source: ITTO Independent Market Monitoring analysis of Eurostat COMEXT.

Improving economic prospects in Europe

The market outlook has brightened in western European countries, with Germany and the Netherlands offering the best opportunities for growth in 2017 and 2018. The outlook for timber markets in southern Europe is bleak, however, with the Portuguese, Italian and Spanish economies all struggling.

In its forecast issued in late 2016, Euroconstruct noted that "Brexit has not yet caused a direct disaster on the European economy, but it has indeed lowered the mid-term expectations, combined with a long list of other factors including China slowing down, Germany slowing down, uncertainty in the US, European banks still not out of trouble, and interest rates are likely to increase".

United States

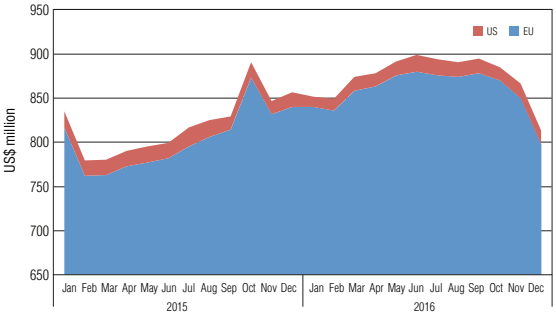
The US Federal Reserve increased interest rates in December 2016, just the second time it has done so in a decade. The impact of this on sentiment in the US far outweighed the tiny adjustment made: it was read as good news, the impact on the economy was immediate, and the already buoyant housing sector got a further boost.

With the US economy much closer to full employment, and given the "live now, pay later" policies of the new administration, consumer sentiment, business growth and investment in housing should all expand, driving up timber consumption and (because the dollar will strengthen) imports.

Consumption of tropical sawnwood down

Despite stronger housing starts and home sales in 2016, tropical sawnwood imports fell by 13% in the US in 2016. The fastest decline was in sapelli, with imports down by about 30% compared with 2015. The US has never been a big market for tropical sawnwood, but with a population of 320 million (compared with the EU's 508 million), and per capita incomes 50% higher than in the EU, the value of tropical sawnwood imports is miniscule (Figure 2) and could be expanded.

Figure 2: EU and US tropical sawnwood imports, 2015–2016



Sources: US Department of Commerce and ITTO Independent Market Monitoring.

Tropical hardwood plywood imports decline ...

US imports of hardwood plywood declined by 4% in 2016, to 3.14 million m^3 (valued at US$1.82 billion) after a 12% increase in 2015. The decline was mainly in imports from tropical producers; imports from Canada, China and the Russian Federation all increased.

... but tropical veneer imports rise

Tropical hardwood veneer imports were worth US$233.7 million in 2016, up 14% from the previous year. Imports from many leading suppliers—including Cameroon, Ghana, India and Italy—doubled compared with 2015. Italy was the largest supplier of tropical veneer in 2016, at US$15.9 million, followed by China (US$9.6 million). Côte d'Ivoire, Ghana and India each shipped tropical veneer worth more than US$6 million to the US in 2016. Veneer imports from Cameroon doubled compared with 2015, to US$2.6 million.

Strong growth in engineered wood flooring imports

US imports of hardwood flooring fell by 15% in 2016, to US$40.5 million, although imports of this product from China grew rapidly. The main exporters of hardwood flooring to the US in 2016 were China (US$9.7 million), Indonesia (US$9.1 million) and Malaysia (US$6.3 million). US imports of engineered flooring were worth US$164.6 million in 2016, up by 21% from 2015, with all major exporters recording increases (Table 1).

Table 1: Year-on-year change in US imports of engineered wood flooring, 2016

	Change (%)
Total	**21**
Brazil	2
Canada	1
China	25
Indonesia	21
Thailand	30
Other	41

Source: US Department of Commerce.

Record high in wood furniture imports

US wood furniture imports reached a record high in 2016, at US$16.7 billion, up by 3% from 2015. The value of imports increased from all major suppliers except Indonesia (down by 9%) and Malaysia (down by 5%). China's share of total imports decreased again in 2016 (although overall it was up by 2%, to US$7.82 billion), to 46.8%, but Viet Nam's share grew to 19.1% (at US$3.19 billion, up by 6%). Malaysia's share of total imports was the same as in 2014, at 3.8%. Canada, Mexico and India recorded the strongest year-on-year growth in wood furniture exports to the US in 2016.

Consumers confident in economy

A consumer survey by the University of Michigan found that US consumers are positive about economic prospects and reported higher household incomes. The National Association of Home Builders is also upbeat about the market for newly built, single-family home—which is good news for the flooring, mouldings and plywood sectors. The Association continues to be concerned, however, about the high cost of labour in the building sector and rising land costs.

The greatest unknown in the US market is where US trade policy will eventually settle. Will there be tariff increases? The idea of a 20% tax on imports from Mexico has been raised, which could have major implications for Mexican wood exporters, US importers—and US retailers and consumers. In an article titled "Border tax proposal riles retailers" in the 7 February issue of *Furniture Today*, Clint Engel wrote that, "A tax on imports from Mexico may help pay for the Trump administration's proposed border wall, but it's the consumer who will end up paying for more expensive goods

if the U.S. government adopts a broader tax on all imports". Engel also noted that the National Retail Federation was against the idea and that a new group, Americans for Affordable Products, which includes home-furnishings retailers, also opposes it.

There has also been tough talk in the Trump administration on the yen and renminbi. It is hoped that cool heads will prevail.

China

Dependence on wood-product imports rising

Even though China is one of the world's biggest wood-product producers, the sector's output from Chinese forests is insufficient to satisfy domestic demand. China's dependence on wood-product imports continues to grow, therefore, and this trend is unlikely to slow—especially now that a total ban on commercial logging in national forests is in effect.

Economy and housing

Achieving growth was tough for Chinese policymakers in 2016. Even with loosened liquidity and government intervention, annual growth fell to a consistent 6.7% in the first three quarters of the year, the slowest rate in 25 years.

This (still relatively strong) growth rate masks important weaknesses in the economy. The main concern is that fixed asset investment is no longer coming from the private sector. Manufacturing overcapacity in many sectors is a burden, and although the services sector did exceptionally well in 2016, the pace of expansion is unlikely to be sufficient to compensate for downturns elsewhere.

With accelerating incomes and rapid urbanization, enthusiasm for homeownership continues to drive China's housing market. Data on real estate investment in 2016 released by the National Bureau of Statistics shows that total investment in the sector was up by 6.9%, year on year; investment in residential buildings, which accounted for 67% of all real estate investment, rose by 6.4%. Nevertheless, the area of land purchased by developers in 2016 fell by 3.4%, in anticipation of tougher times ahead.

The overheated real estate market, which was especially active in early 2016, provided an enormous boost for wood and wood-product imports before the brakes were applied. In the first seven months of 2016, for example, sawnwood imports grew by 17%, year-on-year, log imports rose by 3%, plywood imports jumped by almost 20%, and imports of medium-density fibreboard rose by 16%. Figure 3 shows the growth in logs and sawnwood imports from 2015 to 2016.

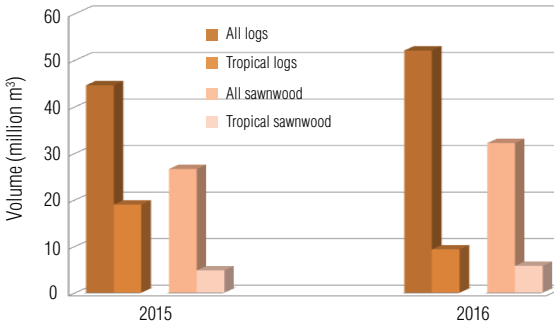
But demand in the housing market is not the reason for rising wood-product imports. In recent years, many Chinese enterprises have been importing high-quality wood-based boards to meet mandatory standards for formaldehyde emissions for panel-style furniture and wood flooring manufactured for international markets. According to Chinese customs data, particleboard imports rose a staggering 32% in the first nine months of 2016, to 560 200 m^3, mainly from Brazil, Germany, Malaysia, Romania and Thailand.

Harvesting ban is a game changer

China's latest five-year plan provides for the expansion of the existing ban on all commercial logging in certain states in the country's northeast, effectively eliminating all logging in China's remaining natural forests by 2017. This ban removes from the timber supply chain a vast volume of mainly higher-value hardwoods; to compensate for this loss, mills are expected to turn to imports.

Imported timber already accounts for more than half China's total timber supply. With the new logging ban, timber imports are expected to further expand to fill the gap created by declines in domestic harvesting due to the expansion of the National Forest Protection Program (NFPP).

Figure 3: Chinese imports of tropical and all logs and sawnwood, 2015 and 2016



Source: China Customs.

The Chinese government introduced the NFPP in 2000, resulting in a ban on harvesting in almost 70 million hectares of national forests. In 2014, the State Forestry Administration expanded the NFPP with the launch of a trial ban on commercial logging in state-owned natural forests in Heilongjiang Province, which accounted for about 30% of China's domestic log supply. The ban was later extended to natural forests in the northeast provinces, and the latest announcement covers all areas not included in previous announcements, effectively placing a logging ban over the entire country.

On the economic front

The consensus among analysts is that the underlying economic theme in China this year will be ensuring stability and containing economic risks in a challenging global environment. Towards the end of 2016, the International Monetary Fund upgraded its growth forecast for China's economy in 2017 to 6.5%, up slightly on previous estimates given the likelihood of continued government stimulus. Overall, analysts expect another year of solid growth in China, which would be welcome in this new era of change and uncertainty.

Tropical and topical

Compiled by Ken Sato

Battle under way in Amazon over dams

The BBC reported in January 2017 that a battle is under way in the Brazilian Amazon between indigenous groups and river dwellers on the one hand and big corporations on the other as the latter proceed with plans to build huge hydroelectric dams. One of these, the Belo Monte dam, which will be the world's fourth-largest dam, partially blocks the Xingu River, a major Amazon tributary, and required the building of a new canal to redirect and channel water. The construction of the dam has created hundreds of temporary jobs but caused substantial deforestation and decimated the local fishing industry. Thousands of riverside dwellers in the area have lost their homes and livelihoods.

Read more at www.bbc.com/news/world-latin-america-38391377

African countries pledge on oil palm

Seven oil-palm-growing African nations have pledged to protect their tropical forests by signing the "Tropical Forest Alliance 2020 Marrakesh Declaration for the Sustainable Development of the Oil Palm Sector in Africa" at the UN Climate Summit in Marrakesh, Morocco, in November 2016, according to a report on the Mongabay website.

The seven countries are the Central African Republic, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Ghana, Liberia and Sierra Leone. They encompass more than 250 million hectares of tropical forest, which is 70 percent of the tropical forests in Africa and 13 percent of the world's total.

With rising global demand for palm oil, the industry is tipped to expand production in Africa. The palm-oil sector has the potential to deliver an economic boost to Africa, but it also brings the risk of significant deforestation and social problems such as land conflicts and human-rights abuses. The declaration states that, in pursuing national plans for the oil-palm sector, governments will address "environmental targets for reduced deforestation and low carbon development, respecting national land use plans and also important social indicators such as land tenure and the rights of local communities and indigenous peoples".

Read the article at https://news.mongabay.com/2016/11/seven-african-countries-pledge-to-protect-their-tropical-forests-from-unsustainable-oil-palm-development

Early warning system for tropical forests

The Japan International Cooperation Agency (JICA) and the Japan Aerospace Exploration Agency (JAXA) launched the JICA–JAXA Forest Early Warning System in the Tropics (JJ-FAST) in November 2016. JICA and JAXA had helped monitor year-round illegal logging in the Brazilian Amazon in 2009–2012 using near-real time observation data generated by JAXA's Advanced Land Observing Satellite (ALOS). ALOS, which had the ability to penetrate clouds, detected more than 2000 instances of illegal logging and contributed to a 40% reduction in illegal logging areas over the monitoring period. JJ-FAST—which can be used by anyone with internet access—uses data on tropical deforestation and forest change collected by the successor to ALOS, ALOS-2, providing updated information on deforestation and forest change in the Amazon every 90 days (on average). The aim is to expand the service to Africa and Asia, ultimately covering about 60 tropical countries. The detection accuracy of deforestation of JJ-FAST will be improved with user feedback.

Read more at www.satprnews.com/2016/11/14/release-release-of-jica-jaxa-forest-early-warning-system-in-the-tropics-jj-fast

Indonesian FLEGT timber arrives in Europe

Indonesia's first verified legal timber shipment arrived at Tilbury in the United Kingdom on 16 January 2017, with the Indonesian Ambassador, Rizal Sukma, on hand to celebrate; a second shipment of verified legal timber arrived in Antwerp, Belgium, a few days later. The shipments mark a major milestone in the European Union's Forest Law Enforcement, Governance and Trade (FLEGT) Initiative, which arose from the FLEGT Action Plan, created in 2003. FLEGT licences allow timber exports to the European Union without additional certification, but exporting countries have struggled to meet licensing requirements. The European Union has entered into voluntary partnership agreements (VPAs) with six countries, including the Government of Indonesia, and the shipment to Tilbury in the UK was the first FLEGT-licensed timber to be exported to the European Union from any country. Other countries with VPAs are Cameroon, the Central African Republic, the Congo, Ghana and Liberia, and negotiations on VPAs are under way with Côte d'Ivoire, the Democratic Republic of the Congo, Gabon, Guyana, Honduras, Lao PDR, Malaysia, Thailand and Viet Nam.

Read more about recent developments in tropical timber markets by subscribing to ITTO's Market Information Service at www.itto.int/market_information_service

Indonesian logging firm fined a record US$1.2 billion for deforestation

In a verdict passed on 18 August 2016 and reported by regional media on November 17, the Indonesia's Supreme Court has ordered the logging firm PT Merbau Pelalawan Lestari (MPL) to pay fines of Rp 16 trillion (US$1.2 billion) for the unlawful clearing of forests, the biggest penalty for environmental damage ever imposed in the country. The Supreme Court ruled that MPL had cleared about 5500 hectares of protected trees within its licence areas in Indonesia's Riau province and illegally logged a further 1873 hectares outside its concession. The decision ended three years of legal proceedings following the filing of a lawsuit against the company by Indonesia's environment ministry in 2013.

Read more at www.eco-business.com/news/indonesian-logging-firm-fined-a-record-us12-billion-for-deforestation

Recent editions

Compiled by Ken Sato

Opuni-Frimpong, E., Opoku, S., Tekpetey, S.L., Nyarko-Duah, N.Y., Owusu, S.A., Essien, C., Obiri, B.D., Opoku, E.M., Appiah-Kubi, E. & Storer, A.J. 2016. *Managing mahogany plantations in the tropics: field guide for farmers*. CSIR-Forestry Research Institute of Ghana, Kumasi, Ghana.

ISBN: 978- 9988-2-4251-0

This publication can be downloaded by inserting the project code PD528/08 Rev.1 (F) into the ITTO project search function at www.itto.int/project_search.

This publication, an output of ITTO project PD 528/08 Rev.1 (F): "Towards sustainable production of mahogany species in plantations in tropical Africa", is a practical guide to the establishment and management of mahogany plantations. It has ten chapters covering descriptions of the various mahogany species, seedling handling, the life cycle of the mahogany shoot borer, the maintenance of mahogany stands, silviculture, the integration of mahogany into agricultural landscapes, and wood-quality assessment. Techniques presented in the guide are drawn from the available literature, personal communications with experts, and field experiments in various ecological zones in Ghana, complemented with lessons learned from other activities conducted under the project. The guide will be useful for farmers and other smallholders growing mahogany, as well as for policymakers, researchers, extension officers and organizations wanting to encourage the sustainable supply of mahogany in West Africa.

Guyana Forestry Commission 2016. *Guyana timber grading rules: revision 2016*. Guyana Forestry Commission, Georgetown.

This publication can be downloaded by inserting the project code PD687/13 Rev.1 (I) into the ITTO project search function at www.itto.int/project_search.

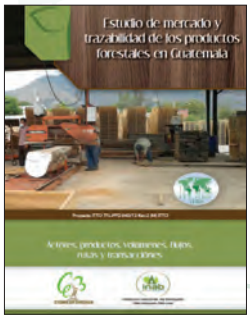
This publication was prepared by the Guyana Forestry Commission as part of ITTO project PD 687/13 Rev.1 (I): "Strengthening the performance of the wood processing sector in Guyana through building local capacity and enhancing national systems that promote forest product trade and sustainable utilization of forest resources". The standardization provided by the revised timber grading rules will promote international recognition and acceptance of Guyana's timber and wood products and encourage the use and marketing of lesser-used timber species. The revised rules draw heavily on grading rules used in the main international markets for Guyana timber (especially lumber) with the aim of reducing differences in expectations between sellers and buyers (see also the article on page 19).

Guevara Sada, S., Moreno-Casasola, P., Escamilla, B. & Lazos, A., eds. 2016. *Manual de buenas practicas rurales [Manual on good rural practices]*. Instituto de Ecología, A.C. (INECOL), ITTO, Comisión Nacional Forestal (CONAFOR) & Instituto Nacional de Ecología y Cambio Climático (INECC).

ISBN: 978-607-7579-63-2

This publication can be downloaded by inserting the project code RED-PD045/11 Rev.2 (M) into the ITTO project search function at www.itto.int/project_search.

This manual, published in Spanish, is a product of ITTO project RED-PD 045/11 Rev.2 (M). Its aim is to assist farmers on the coastal plains of Veracruz in the Gulf of Mexico to increase the productivity of their fields and grazing lands by using trees to produce woodfuel, fruits and fodder; stabilize soils; store carbon; assist water infiltration; and generate other benefits. The widespread deployment of such uses would increase the economic value of coastal forests in the Gulf of Mexico and the Mexican Pacific region and thereby encourage their sustainable management.

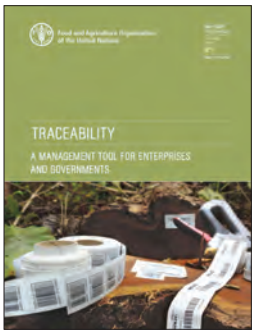


INAB, ITTO & IARNA/URL 2016. *Análisis de vulnerabilidad de comunidades vinculadas a las cadenas productivas forestales [Vulnerability analysis of communities linked to forest production chains]*. Serie Técnica GT-011. Instituto Nacional de Bosques (INAB) and Instituto de Investigación y Proyección sobre Ambiente Natural y Sociedad (IARNA)/Universidad Rafael Landívar (URL), Guatemala City, and ITTO, Yokohama, Japan.

INAB, ITTO & IARNA/URL 2016. *Estudio de mercado y trazabilidad de los productos forestales en Guatemala [Market study and traceability of forest products in Guatemala]*. Instituto Nacional de Bosques (INAB) and Instituto de Investigación y Proyección sobre Ambiente Natural y Sociedad (IARNA)/Universidad Rafael Landívar (URL), Guatemala City, and ITTO, Yokohama, Japan.

These publications can be downloaded by inserting the project code (TFL-PPD040/13 Rev.2 (M)) into the ITTO project search function at www.itto.int/project_search.

These two publications in Spanish are outputs of ITTO pre-project TFL-PPD 040/13 Rev.2 (M): "Creation of a program to strengthen the traceability of forest products of legal origin in Guatemala". The aim of the pre-project was to analyze the traceability and legality conditions of forest products in Guatemala and develop a project proposal to establish effective monitoring and control mechanisms.

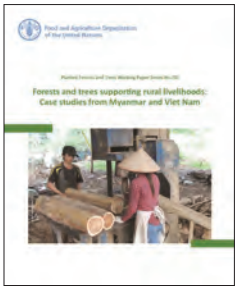


Vandenhaute, M. & Laporte, J. 2016. *Traceability: a management tool for business and governments*. FAO, Rome.

ISBN: 978-92-5-109423-5

Available in English, French and Spanish at: www.fao.org/documents/card/en/c/83dcd903-46ce-4612-859c-460e883e5e59

This publication uses case studies in Benin, Cameroon, the Democratic Republic of the Congo, Gabon and Liberia to illustrate the key factors to be taken into account when designing a wood traceability system and the added benefits of such a system for governments, the private sector and community forests. This is the first publication in a technical series intended to build on the experiences gained in the implementation of the FAO–FLEGT Programme through projects in Africa, Asia and Latin America.



Kollert, W., Thanh Thuy, L.T., Ley Voan, V., Soe Oo, T. & Khaing, N. 2016. *Forests and trees supporting rural livelihoods: case studies from Myanmar and Viet Nam*. Planted Forests and Trees Working Paper Series No. 50. FAO, Rome.

Available at: www.fao.org/publications/card/en/c/9f13f1b3-801a-4b4f-9402-c0adc03afd79

This working paper is the output of a learning programme conducted in October 2015, when the Forest and Farm Facility, in cooperation with the Vietnamese Farmers' Union and IUCN-Vietnam, organized a study trip for 20 government officials, university staff and farmers from Myanmar to northern Viet Nam. During the study trip, a questionnaire-based survey was conducted among farmers in both Myanmar and Viet Nam to ascertain the contributions of forests and trees to their livelihoods and the protection of natural resources. This paper is based on the results of the study trip and survey.

Meetings

3–7 April 2017
19th Commonwealth Forestry Conference
Dehradun, India
Contact: www.cfc2017.in

3–17 April 2017
2017 Landscape Governance Course
Bogor, Indonesia
Contact: www.cifor.org/event/2017-landscape-governance-course

18–21 April 2017
International Conference on Sustainable Mangrove Ecosystems: Managing a Vital Resource for Achieving the SDGs and the Paris Agreement
Bali, Indonesia
Contact: www.itto.int/mangrove2017

1–5 May 2017
12th Session of the UN Forum on Forests
New York City, USA
Contact: www.un.org/esa/forests/events/unff-12

4–5 May 2017
RISI's Forest Investment Conference
London, UK
Contact: events.risiinfo.com/investment-conference

8–12 May 2017
ITTO Second Regional Workshop on ITTO Voluntary Guidelines for the Sustainable Management of Natural Tropical Forests
Cotonou, Benin
Contact: Polycarpe Masupa-Kambale at masupa@itto.int

15–18 May 2017
8th Biomass Pellets Trade & Power
Tokyo, Japan
Contact: www.cmtevents.com/aboutevent.aspx?ev=170501&

16–17 May 2017
Forest and Landscape Investment Forum
Rwanda, Kigali
Contact: www.fao.org/forestry/events

17–19 May 2017
Water–Soil–Waste: 2nd Dresden Nexus Conference: Session A.4: Water and Soil Related Ecosystem Services provided by Forests and Agroforestry Systems
Dresden, Germany
Contact: www.dresden-nexus-conference.org/2017

19–21 May 2017
Third Global Forum for Ecological Economics in Forestry: Harmonious Future for Human Wellbeing
Nanchang, Jiangxi Province, China
Contact: gfeef.org

22 May 2017
International Day for Biological Diversity 2017
Montreal, Canada
Contact: www.cbd.int/meetings

22–24 May 2017
2017 Conference to Explore Latest Industry Trends in Asia and Beyond
Shenzhen, China
Contact: events.risiinfo.com/asian-conference

22–26 May 2017
LIGNA 2017: Making More Out of Wood
Hannover, Germany
Contact: www.ligna.de/home

29 May–2 June 2017
XVI World Water Congress
Cancun, Mexico
Contact: www.worldwatercongress.com

29 May–2 June 2017
4th World Landslide Forum
Ljubljana, Slovenia
Contact: www.wlf4.org

4–9 June 2017
Tree Biotechnology 2017
Concepción, Chile
Contact: iufrotreebiotech2017.com

12–15 June 2017
European Biomass Conference & Exhibition
Stockholm, Sweden
Contact: www.eubce.com

12–16 June 2017
Forest Sector Innovations for a Greener Future
Vancouver, Canada
Contact: www.iufrodiv5-2017.ca

12–16 June 2017
Expert Consultation on Global Forest Resources Assessments: Towards FRA 2020
Joensuu, Finland
Contact: www.fao.org/forestry/events

14–16 June 2017
2017 IUFRO Division 5 (Forest Products) Conference
Vancouver, BC, Canada
Contact: www.iufro2017.ca

19–21 June 2017
EuroCoppice Final Conference
Limoges, France
Contact: www.eurocoppice.uni-freiburg.de/conferences/limoges

27–28 June 2017
Promotion of Green Jobs in the Forest Sector: Challenges and Opportunities
Bratislava, Slovakia
Contact: michal.vanco@foresteurope.org

7–11 July 2017
Forest Regeneration in Changing Environments
Corvallis, USA
Contact: blogs.oregonstate.edu/forestregen2017

17–19 July 2017
High-level Political Forum on Sustainable Development 2017
New York City, USA
Contact: sustainabledevelopment.un.org/hlpf

18–20 July 2017
7th Forest Science Symposium: Research Underpinning the Sustainability of a Diverse Forestry Sector
Pietermaritzburg, South Africa
Contact: www.iufro.org/download/file/26231/6411/7th-forest-science-symposium-2017-south-africa_pdf

24–27 July 2017
23rd Meeting of the CITES Plants Committee
Geneva, Switzerland
Contact: www.cites.org/eng/news/calendar.php

24–27 July 2017
Promoting Sustainable Resources from Plantations for Economic Growth and Community Benefits
Jogjakarta, Indonesia
Contact: www.iufroinafor2017.com

4–15 September 2017
13th Conference of the Parties of the United Nations Convention to Combat Desertification
Ordos, Inner Mongolia, China
Contact: www2.unccd.int/cop13

6–8 September 2017
2nd Asia-Pacific Urban Forestry Meeting
Seoul, Republic of Korea
Contact: www.fao.org/forestry/events

11–13 September 2017
2017 International Renewable Energy Conference
Mexico City, Mexico
Contact: www.ren21.net/irecs

18–22 September 2017
IUFRO 125th Anniversary Congress
Freiburg, Germany
Contact: iufro2017.com

18–22 September 2017
29th Session of the North American Forest Commission
Canada, Edmonton
Contact: www.fao.org/forestry/events

25–29 September 2017
30th Session of the Latin American and Caribbean Forestry Commission
Tegucigalpa, Honduras
Contact: www.fao.org/forestry/events

26–29 September 2017
9th Pacific Regional Wood Anatomy Meeting
Bali, Indonesia
Contact: woodconference.fkt.ugm.ac.id/9th-prwac

2–6 October 2017
3rd International Conference on Scaling-up Global Efforts to Secure Community Land and Resource Rights
Stockholm, Sweden
Contact: rightsandresources.org/en/event/commitments-implementation-strategies-accelerate-recognition-rights-ground

8–13 October 2017
Forest Stewardship Council General Assembly
Vancouver, Canada
Contact: ic.fsc.org

9–13 October 2017
Lasy2017: Joint Session of the ECE Committee on Forests and the Forest Industry and the FAO European Forestry Commission
Warsaw, Poland
Contact: www.unece.org/forests/lasy2017#

16–18 October 2017
Helping the Forest Products Industry Make Better Decisions: RISI 32nd Annual Conference
Boston, USA
Contact: events.risiinfo.com/north-american-conference

22–26 October 2017
IUFRO Tokyo 2017
Tokyo, Japan
Contact: web.tuat.ac.jp/~iufro-tokyo2017

23–27 October 2017
27th Session of the Asia-Pacific Forestry Commission
Colombo, Sri Lanka
Contact: www.fao.org/asiapacific/apfc

2–4 November 2017
11th International Conference on Wood Science and Engineering in the Third Millennium
Brasov, Romania
Contact: www.unitbv.ro/il/Conferinte/ICWSE2017.aspx

6–17 November 2017
23rd Session of the Conference of the Parties to the UN Convention on Climate Change
Bonn, Germany
Contact: secretariat@unfccc.int

15–19 November 2017
2017 Society of American Foresters National Convention
Albuquerque, New Mexico, USA
Contact: www.safconvention.org

27 November –2 December 2017
53rd Session of the International Tropical Timber Council and Sessions of the Associated Committees
Lima, Peru
Contact: www.itto.int/workshop_detail/id=4991

4–6 December 2017
3rd Meeting of the UN Environment Assembly
Nairobi, Kenya
Contact: www.unep.org/about/sgb

5–7 December 2017
53rd Global Environment Facility Council Meeting
Washington, DC, USA
Contact: www.thegef.org/events/53rd-gef-council-metting

11–15 December 2017
23rd Session of the Near East Forestry and Range Commission
Beirut, Lebanon
Contact: abdelhamied.hamid@fao.org

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