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Promoting the conservation and sustainable development of tropical forests

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Putting the pieces together

Sustainable forestry has much to offer at all scales, from the household to the planetary. Certain non-renewable resources will become scarcer in coming decades, but the demand for materials is likely to continue to escalate. There could be a resources crunch—but forestry can help avert this while also providing crucial environmental services.

In this edition, ITTO Executive Director Dr Gerhard Dieterle (page 3) sets out his argument for viewing forest products in the same way as food—that is, as essential commodities. The world is going to need a greatly increased supply of forest products in coming decades, including as substitutes for non-renewable materials and fossil energy. Dr Dieterle believes this need can be harnessed by demand-side measures to incentivize forest producers to manage their forests sustainably. ITTO is well placed, he says, to assist its member countries in this, given its broad experience in field projects and its long-running role in policy development.

Even though the demand for forest products is certain to shoot up in coming decades, this doesn't mean that forest production must industrialize. Small producers are likely to play an important role, and Dr Dieterle calls for capacity-building among small-scale, family and community-level producers and traders to enable them to organize into associations to build economies of scale and increase their marketing power. Moreover, says Dr Dieterle, other incentives could be applied at the national level and across timber markets to boost "good players" in the sector.

Other articles in this edition look more closely at small-scale producers. Nalvarte Armas and co-authors (page 6) describe an ITTO project in Peru that helped dozens of small-scale enterprises add value to their timber products and increase production. It did this by providing training in various technical aspects of wood-product production and business management,

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Cover image: A worker assembles a wooden chair at Industrias del Machihembrado Daniella in Pucallpa, Peru. *Photo: E. Sangama*

Above: Minato-mirai, Yokohama, Japan. *Photo: Ramón Carrillo/ITTO*

and it assisted 15 enterprises to develop business plans and implement these. The project also catalysed the construction of a "techno-ecological" industrial park for small and medium-sized enterprises in the forest and other sectors, and undertook various other activities.

Irsyal Yasman and co-authors describe another ITTO project (page 13), in Indonesia, that piloted a microcredit scheme aimed at boosting the efficiency and profitability of small and medium-sized forest enterprises in the Ciamis Regency in West Java Province. The area hosts a large community-forest resource that is supporting an emerging small-scale processing sector—with nearly 400 small sawmills in the regency. Despite its emergence, the forest sector struggles to obtain financing to upgrade facilities and introduce new products. The ITTO project, which was implemented by Indonesia's Natural Resources Development Center, acted as guarantor to three small wood-processing enterprises, enabling them to obtain bank loans at reasonable interest rates. The project also provided training to 15 small-businesses managers aimed at increasing skills in wood processing and the production of high-quality timber products. In addition to helping small and medium-sized forest enterprises to build capacity and assisting some to obtain credit, the project has generated lessons that can be used to scale up the scheme.

Another ITTO project, reported by Maricélia G. Barbosa and co-authors (page 17), provides important learnings for sustainable rural development in the Brazilian Amazon. There, many farming families are eking out their living in degraded landscapes after excessive clearing and overly intensive slash-and-burn agriculture. The project worked closely with 30 families in three municipalities in Pará state to map their farms and determine the best sites for restoration efforts through tree planting, with farmers deciding which species to plant. The project achieved excellent results, with successful tree establishment and growth leading to improved soils, increased agricultural productivity, a better local climate and more wildlife. "All participating families have noted positive changes," report the authors, "and are proud of the work they have done to achieve this." Among other things, farmers who have restored degraded land on their properties are gaining greater access to credit after visits to properties by credit agencies showed positive changes in production. These farmers are now agents of change, helping to disseminate and replicate conservation-agriculture practices and sustainable natural resource use in the region.

ITTO will continue its successful work programme with new funds pledged at the 53rd session of the International Tropical Timber Council (ITTO's governing body), which convened late last year (page 21). The Council took an important step in its internal governance by adopting the ITTO Policy Guidelines on Gender Equality and Empowering Women to assist the Organization in mainstreaming gender considerations into its policy and project work. The Council also hosted the 2017 Annual Market Discussion, which addressed the need for more investment in tropical timber industries and tropical forestry. One of the presenters, Ingrid Nielsen from the consultancy firm Indufor, reported on a project that has helped small-scale landholders in Tanzania establish 15 000 hectares of plantations. "It is possible, it is profitable and it is sustainable" to scale up smallholders in clusters and associations to produce large volumes of timber, Nielsen says.

The world is capable of meeting future wood demand: it's a matter of putting the pieces together.

Timber: the high-fibre diet the world needs

The world needs more wood—requiring greater attention to green supply chains and the sustainable management of productive forests

by Gerhard Dieterle
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Commodities produced in tropical countries such as palm oil, soy, beef and timber are not always viewed in a positive light. In the eyes of many, such products are associated with deforestation, forest degradation, illegality, corruption and the violation of the rights of indigenous peoples and local communities.

Nevertheless, the rapidly growing global population demands such commodities, which today move across countries and borders at an industrial scale. This article looks at tropical timber and how tropical timber producers and consumers can ensure that the supply of this commodity contributes to sustainability and equitable growth.

In demand: Globally, demand for wood—such as this teak (*Tectona grandis*) in Togo—is expected to continue growing rapidly, making sustainable forest management an urgent necessity. *Photo: Gerhard Dieterle /ITTO*

Forest degradation looms as major issue

Deforestation has received wide attention in the global climate-change regime, especially under REDD+.[1] Less attention has been paid, however, to what happens inside the forest. Forest degradation is more challenging to address than deforestation because it occurs in dispersed patterns across large areas of land, and it is more difficult to assess reliably, even with advanced remote sensing technology.

Nevertheless, it seems clear that forest degradation has been greatly underestimated. A recent study published in *Science* (Baccini 2017) suggests that degradation is contributing more than two-thirds of all greenhouse gas emissions from tropical forests and that tropical forests might have become net emitters as a result.

Forest degradation reduces productive capacity

Degraded forests have a reduced capacity to supply local, national and global markets with essential forest products. Yet demand for harvested wood products is increasing. If not addressed, the supply deficit of timber and other harvested forest products could reach several billion cubic metres per year, as suggested by various studies, including Indufor (2012), which projects a deficit of plantation roundwood of 4.5 billion m^3 per year by 2050 (Figure 1). This figure could be even higher if woodfuel demand is taken into account.

I believe we need to look at forest products in the same way we look at food—as essential commodities. Billions of people, especially the rural poor, need forest products to survive—for shelter, food, medicine and income. Business as usual is not an option because it will mean more deforestation and forest degradation, or the greater use of non-renewable materials, or increased wood imports, or all these—thereby undermining efforts to fight climate change, promote sustainable development in the tropics and improve the lives of forest-dependent people.

As a matter of urgency, therefore, productive forests, forest landscapes and value chains need to become cornerstones of the global forest climate and development agenda. A multipronged, integrated approach is required, comprising the following:

1) Create an enabling framework for forest production and conservation, including good forest governance, the rule of law, and equitable rights to land.
2) Protect high-conservation-value forests, especially remaining primary tropical forests, as a global public good.
3) Restore degraded multipurpose forest landscapes for productive use.
4) Invest in productive forests for timber, pulp and energy and manage them sustainably.
5) Reduce the production footprint of all agricultural and forestry commodities by managing and using resources sustainably and efficiently.
6) Establish verified degradation-free and deforestation-free supply chains and trade across the land-use spectrum in both domestic and international markets.

ITTO is well placed to assist its member countries in all these aspects because of its vast experience in field-implemented projects and its policy development in reforestation and forest management, timber industries, forest economics, statistics, and markets across the tropics.

If efforts are scaled up on landscape restoration, sustainable forest management and legal and sustainable supply chains, forests and harvested wood products could make significantly greater contributions to sustainable and inclusive growth, jobs and income and deliver significant global benefits. The international forest and climate-change regime should especially take into account the huge opportunities for substituting non-renewable construction materials and fossil energy with sustainably harvested wood products.

1 REDD+ = reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.

Value adding: There is an urgent need to incentivize good forest operators and communities to sustainably produce and market timber and other forest products. *Photo: W. Cluny*

The way forward

Focus on value and supply chains

For too long, forest problems have been addressed from the supply side rather than the demand side. In forestry, the approach has been to pursue and demonstrate sustainable forest management while largely ignoring markets and the financial viability of such management. This has been the case in many REDD+ efforts, which mainly reward the value of carbon in standing trees. Such rewards are important, but they are unlikely to generate sufficient income to fully meet the needs of forest owners, and REDD+ approaches also have limited scope to address the coming huge demand–supply gap in forest products. Results-based payments such as REDD+ are an important means for securing high-value conservation areas (where timber production is likely to be minimal). In productive forests, however, we need urgently to incentivize good forest operators and communities to sustainably produce and market timber and other forest products, and this can be done with a huge boost in demand for sustainably produced timber. In my view, this is the only option for safeguarding the integrity of forests in areas under heavy pressure from growing local and in-migrating populations.

Increase markets for sustainable products

Countries and businesses should step up their procurement and consumption of verified legal and sustainable commodities. They should get serious about the use of systems for tracking supply from production sites to end-users. Innovative approaches and initiatives exist but have not reached a tipping point, especially for timber.

Private and public "responsible purchasing policies" need to be adopted and given equal prominence in all countries—consumers and producers alike—to provide a mass market for sustainably produced forest products. Small and medium-sized enterprises and communities in developing countries in particular find it difficult to meet complex standards, which vary between markets. Simplifying and standardizing requirements globally would be a huge step forward.

Build capacity

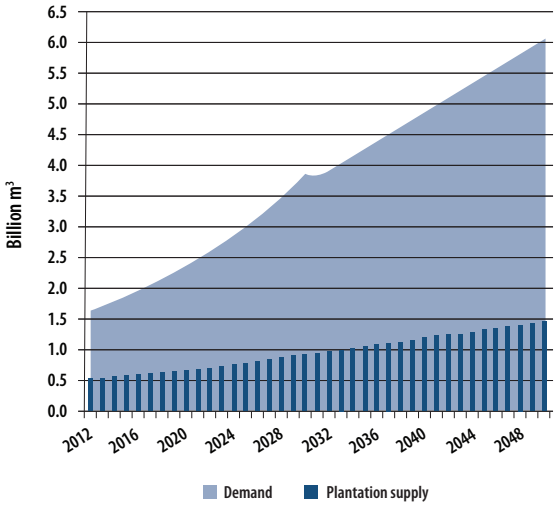
Capacity building is needed at all points in the value chain. For example:

- Governments in producer countries need support for establishing an enabling environment for sustainable timber production and trade.
- Small-scale, family and community-level producers and traders need greater capacity to organize into associations and cooperatives to build economies of scale and increase marketing power.
- Producers and other actors on the ground need greater understanding of verified legal and sustainable production and tracking systems and the capacity to implement these.
- Importers, traders and processors need access to information on the supply of and demand for sustainable forest products.

Provide transformational incentives

Incentive mechanisms and investments are needed at all stages of supply chains to promote sustainability and discourage bad practices. This might involve taxation and fiscal reforms, the clarification of land tenure, the promotion

Figure 1: Supply and demand scenarios, 2012–2050



Source: Indufor (2012).

of small, medium-sized and community enterprises, and improved governance. The provision of incentives will reduce the risks associated with investment in small enterprises; this, in turn, will help attract foreign investment in local timber production and processing and thereby remove the artificial dichotomy between domestic and international supply chains and markets.

Step up international support

International support should focus on combating forest degradation as a way of ensuring the adequate supply of timber, wood-based energy and other forest products into the future. If the necessary action is not forthcoming, the consequences of escalating demand will be devastating—including accelerated deforestation and forest degradation and the substitution of wood with non-renewable resources. This would have highly negative consequences for the climate and development.

The international forest regime needs to scale up complementary finance to address forest degradation in the same way it addresses deforestation. More international support is urgently needed to build capacities and provide incentives for legal and sustainable supply chains.

A sound financing architecture would consist of the following three interdependent instruments:

1) Access to commercial investment funds such as loans and guarantees.
2) Support by the international community for governments to finance incentive mechanisms that encourage private-sector or community investments in sustainable forest supply chains—for example through results-based finance, concessional loans and development policy loans.
3) Development assistance for (for example) capacity building, the promotion of user associations, land-tenure reform, and timber tracking.

Conclusion

The world needs more wood. This means stepping up efforts to restore and sustainably manage the large areas of degraded forests worldwide, especially in the tropics. I believe that consumers—both domestic and international—can be an irresistible driver of those efforts by supporting producers who are striving to deliver sustainability in the forest.

ITTO is strongly committed to realizing this vision by working in partnership with the private sector and producers and consumers alike. I believe we can make a difference by promoting deforestation-free—and degradation-free—global supply chains.

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This article is based on a keynote address made by Dr Dieterle at the International Symposium on the Promotion of Deforestation-Free Global Supply Chains to Contribute to Halting Deforestation, Tokyo, Japan, 23 January 2018.

Small companies aim big

An ITTO project has helped small timber enterprises in the Peruvian Amazon add value to their products

by Walter Nalvarte Armas[1], Willy Echevarria Shardin[2], Edinson Sangama Barbarán[2], William Chipana Curiñaupa[2] and César Acurio Zavala[2]

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Adding value: A worker for Citeindigena, one of the small enterprises assisted by the project, assembles a wooden vessel with turned legs. *Photo: E. Sangama/CNF*

Due to its low level of maturity in business management, the Peruvian forest sector lacks a consolidated business development model. In today's complex and competitive environment, the only companies capable of surviving and being profitable in a sustainable way are those that are cost-efficient and highly productive and which have the liquidity to address market risks. Moreover, it is essential to add value to timber. For this reason, Peru's National Forestry Chamber (*Cámara Nacional Forestal*—CNF) implemented ITTO project PD 540/09 Rev.2 (I): "Support to improve the productivity of the Peruvian timber industry for the production of higher value added products" from October 2012 to November 2016[1], with technical and financial support from ITTO and in collaboration with Peru's National Forest and Wildlife Service (SERFOR).

The aim of the project was to increase the competitiveness of timber products from the central and southern areas of the country, specifically the Amazonian departments of Ucayali and Madre de Dios, as well as Arequipa (in the southern highlands), through the production of value-added timber products and by increasing access to national and international markets. Table 1 shows the timber species used, their common names, and the main products produced from them under the project.

The project set out to achieve its aim through an intensive training programme centred on technical, environmental and business management aspects. The programme enabled small and medium-sized producers to process and market timber products at the quality, quantity and cost required by the market.

Small companies that benefited from the project

The project benefited individual timber companies as well as small enterprises organized as guilds, such as the El Triunfo Carpenters and Cabinetmakers Association, established in 2003, which brings together 29 small-business owners comprising carpenters, cabinetmakers and forest concession-holders; the Islas Peru Carpenters Association, established in 2006 and made up of 25 small enterprises; and the Nuevo Triunfo Industrialists Association, established in 2009, which brings together 26 small-business owners, including carpenters, cabinetmakers and forest concession-holders. These associations are based in Puerto Maldonado in the department of Madre de Dios, and the business owners are experienced carpenters and cabinetmakers. Their main production activity is the manufacture of furniture.

In the department of Ucayali, the project benefited ten timber companies in Pucallpa, the country's main timber-processing centre:

- **Industrias del Machihembrado Daniella:** this company, which began operating in 2001, produces furniture, doors, dimensioned timber and, more recently, blockboard. The plant has a total built area of 1700 m^2 and 12 employees. Its average monthly production volume is about 24 m^3, and its average monthly turnover is about US$24 500. The company's technical innovation is the recycling of wood waste for the manufacture and production of blockboard. To this end, the company invested approximately US$20 000 in the purchase of a grinder-style wood-pressing system and in an exhibition area for its products. Since project start-up, the company has significantly increased its production of dimensioned timber (up by 50%), furniture (+67%) and doors (+167%).

1 The project was officially declared completed in November 2016 at the 52nd session of the International Tropical Timber Council.

Table 1: Timber species, and their uses, promoted by the project

Scientific name	Common name	Uses
Amburana cearensis	Ishpingo	Furniture
Apuleia molaris	Ana caspi	Decking and floorboards; ceilings
Aspidosperma macrocarpon	Pumaquiro	Dimensioned timber, doors
Burseraceae	Copal	Beams
Calycophyllum spruceanum	Capirona	Decking and floorboards; dimensioned timber; furniture; doors; tongue-and-groove timber; beds
Cedrela odorata	Cedar	Furniture; ceilings
Cedrelinga catenaeformis	Tornillo	Furniture; doors; ceilings; pallets
Clarisia racemosa	Mashonaste	Furniture
***Copaifera* spp.**	Copaiba	Furniture; doors; pallets
Dipteryx odorata	Shihuahuaco (also known as cumarú)	Decking and floorboards
***Hymenaea* spp.**	Azúcar huayo	Decking and floorboards
Jacaranda copaia	Achihua	Wood–cement panels
Lecythidaceae	Cachimbo, red cachimbo, misa	Dimensioned timber; furniture; doors; ceilings; pallets; blockboard
Manilkara bidentata	Quinilla	Decking and floorboards; dimensioned timber; furniture; tongue-and-groove timber; ceilings; beams; prefabricated houses
Meliaceae	Requia	Doors
Myroxylon balsamum	Estoraque	Decking and floorboards; dimensioned timber; doors; beams; sleepers
***Ormosia* spp.**	Huayruro	Furniture; beams
Paramachaerium ormosioides	Aguano masha	Decking and floorboards; dimensioned timber; doors; sleepers
Sapotaceae	Caimitillo, quina quina	Dimensioned timber; furniture; tongue-and-groove timber; pallets
Septotheca tessmannii	Utucuro	Dimensioned timber
***Sloanea* spp.**	Huangana	Dimensioned timber
Tabebuia serratifolia	Tahuarí	Decking and floorboards
***Terminalia* spp.**	Yacushapana	Dimensioned timber; beams; pallets

- **Maderera Marañón:** this company, which began operating in 1993, produces sleepers, dimensioned timber and beams. The plant has a total built area of 3600 m^2 and 40 employees. Its average monthly production volume is about 600 m^3 and the average monthly turnover is US$200 000. The company's technical innovation is the production of timber sleepers for cranes in oil refineries ("MATS"), which has earned the company excellent economic returns. New investments made by the company include an increase in the size of the built area by 100% (from 1800 m^2 to 3600 m^2) and the purchase of a log saw-cutting machine and a multilam (multiple blade) saw machine for US$68 000. Since project start-up, the company has significantly increased its production of sleepers (up by 33%), dimensioned timber (+50%) and beams (+33%).
- **Maderas Mathews:** this company, which began operating in 2000, produces sleepers, tongue-and-groove timber, dimensioned timber, school furniture and doors. The plant has a total built area of 600 m^2 and eight employees. Its average monthly production volume is about 59 m^3 of processed timber, and it has an average monthly turnover of more than US$12 000. The company's technical innovations include the production of new products such as doors and chairs and investments in machinery and equipment to meet production needs, including machines to make furniture plugs, blade-making machines and other products. The company purchased three cut-off saws and two band sanders at a total cost of US$10 000. The company has significantly increased its production of sleepers (up by 100%) and dimensioned timber (+33%) since project start-up.
- **Industria Montes:** this company, which began operating in 1996, produces furniture, school furniture and doors. The plant has a total built area of 2000 m^2 and six employees. It produces 10 m^3 of processed timber monthly. The company's innovation is the design of new furniture and door models, as well as improved product quality. Since project start-up, the company has significantly increased its production of furniture (up by 50%), doors (+33%) and beds (+87%).

Fine dining: This finished dining-room set was produced by Asociación de Carpinteros Señor de Coyllority in Puerto Maldonado, Peru. *Photo: W. Chipana*

Wrapped and ready: Pallets of timber floorboards produced by Pietra Forestal Peru SAC in Puerto Maldonado, Peru, are prepared for dispatch to markets. *Photo: W. Chipana*

- **Wech Construcciones y Servicios Generales:** this company, which began operating in 2004, produces furniture, pallets, doors and beams. The plant has a total built area of 800 m^2 and ten employees, and it produces 8 m^3 of processed timber monthly. The company's technical innovations include the design and construction of prefabricated houses using quinilla (*Manilkara bidentata*) wood-based panels, and it is now making the first prototypes of these houses. Since project start-up, the company has significantly increased its production of doors (up by 100%).
- **Maderera Los Cinco Hermanos:** this company, which began operating in 2006, produces tongue-and-groove timber, dimensioned timber and school furniture. The plant has a total built area of 600 m^2 and five employees, and it produces 12 m^3 of processed timber per month. Since project start-up, the company has significantly increased its production of tongue-and-groove timber (up by 100%) and dimensioned timber (+33%).
- **Carpinteía Llaiqui:** this company, which began operating in 1994, produces tongue-and-groove timber, dimensioned timber and school furniture. The plant has a total built area of 400 m^2 and six employees, and it produces 10 m^3 of processed timber per month. The company has installed a small sawmill for the production of bolaina (*Guazuma crinita*) and marupa (*Simarouba amara*) floorboards, making an investment of US$15 000 for this purpose. Since project start-up, the company has significantly increased its production of tongue-and-groove timber (up by 50%) and dimensioned timber (+100%).
- **Servicios La Trocha:** this company, which began operating in 1998, produces tongue-and-groove timber, dimensioned timber and beams. The plant has a total built area of 1000 m^2 and 12 employees, and it produces close to 40m^3 of processed timber per month. The company has invested US$7000 in a bandsaw for boardmaking and in increasing the plant's storage area. Since project start-up, the company has significantly increased its production of tongue-and-groove timber (up by 100%) and dimensioned timber (+33%).
- **Inversiones Rodrigo Denis:** this company, which began operation in 2012, produces tongue-and-groove timber, dimensioned timber and beams. The plant has a total built area of 600 m^2 and eight employees, and it produces 94 m^3 of processed timber per month. The company is planning to produce new products, such as chairs. Since project start-up, it has significantly increased its production of tongue-and-groove timber (up by 50%), dimensioned timber (+100%) and beams (+25%).

Fair furniture: Display of timber products with fine finishings. *Photo: E. Sangama*

- **Reaserradero Marthita:** this company began operating in 2000 and produces sleepers, tongue-and-groove timber, dimensioned timber, school furniture and doors. The plant has a total built area of 600 m^2 and eight employees, and it produces about 40 m^3 of processed timber per month. The company is improving its plant's infrastructure. Since project start-up, it has significantly increased its production of tongue-and-groove timber (up by 67%) and beams (+100%).

Given the large number of companies that benefited from the project in Arequipa, key information on those companies in presented in Table 2.

The following companies have benefited from the project in Madre de Dios:

- **Corporación Forestal Iñapari:** this company began operating in 2012 and produces shihuahuaco timber decking and floorboards. Its sales figures jumped from US$1.11 million in 2012 to US$1.5 million in 2014. The company invested in forest machinery—buying a front loader (Fiat) and a forest tractor (Caterpillar 518-2) for a total value of US$66 000—and in land and infrastructure at a total value of US$200 000.
- **Forestal Landek:** this company, which began operating in 2010, produces shihuahuaco decking, boards and flooring. In 2014, the company invested US$312 000 in the purchase of a caterpillar tractor (Caterpillar D6E), two drying kilns (BigonDRX), a six-head moulder (Weining), a double-side planer, two cross-cut saws and a blade sharpener.
- **G y G Negociaciones:** this company, which began operating in 2009, produces wood–cement panels under the trade name of ECOCRETO, using achihua (*Jacaranda copaia*) sourced from secondary forests in Madre de Dios. The panels are marketed in 1.2 m long by 0.6 m wide by 2-inch thick sheets for wall surfaces and in 1.2 m long by 0.6 m wide by 1.25-inch thick sheets for ceilings. Other products include rails, quinilla-wood tool handles and doors, and windows made from misa (*Lecythidaceae*). The company's sales figures rose from US$6600 in 2012 to US$14 370 in 2014. The company invested a total of US$8363 in 2014 in the purchase of a jointer plane, a joinery band saw, a blade sharpener, a spindle moulder and a wood-shaving machine.
- **Maderera Canales Tahuamanu (CATAHUA):** this company, which began operating in 2010, produces sawnwood from species such as shihuahuaco, ishpingo, caoba (mahogany), estoraque, tahuarí, pumaquiro and azúcar huayo. The company's sales figures grew from US$1 752 353 in 2012 to US$2 195 191 in 2014.
- **Maderera Industrial Sur Oriente:** this company produces shihuahuaco timber decking and boards. Its sales figures increased from US$300 000 in 2012 to US$480 000 in 2014. In 2014, the company spent US$143 000 in the purchase of a forest tractor (Caterpillar 518), a front loader (Caterpillar 950B), a portable sawmill (Lucas Mill) and a truck (Toyota), and it invested US$100 000 in the purchase of a block of land.

Table 2: Key information on companies in Arequipa that benefited from the ITTO project

Company name	Began operation	Products	Floor area (m^2)	No. of employees	Production volume (m^3)	Annual turnover (US$)
Centro Maderero San Antonio	2003	Wood boards, wood struts and blocks, prefabricated houses	80	4	150	50 000
Maderera Santa Fe de JJ La Isla	1998	Timber boards, wood struts and blocks	30	2	176	55 000
Forestal AQP	1967	Timber boards, wood struts and blocks, and prefabricated houses	120	5	142	53 000
Prysmas	2003	Timber boards, wood struts and blocks; wood-drying and heat-treatment services	80	3	300	95 000
MADESERVIS	2003	Timber boards, wood struts and blocks, pallets; heat-treatment services	60	5	342	128 000
SLM Servicios Generales	1984	Timber boards, wood struts and blocks	100	7	314	137 000
Corporación Madera Sin Fronteras	-	Timber boards, wood struts and blocks	60	3	200+	64 000
Maderera Universal	-	Timber boards, wood struts and blocks	60	4	180	<60 000
Maderera Industrial ENESCA	-	Timber boards, wood struts and blocks	40	3	216	80 000
Maderas Transformadas ORION	1983	Timber boards, wood struts and blocks, prefabricated houses, pallets; wood-drying and heat-treatment services	80	4	330	144 000
Maderera J&A Los Pinos	-	Timber boards, wood struts and blocks	40	5	157	49 000
Maderera Sofía	-	Timber boards, wood struts and blocks	50	3	120	43 000
Empresa Maderera YEMESU	-	Timber boards and wood struts and blocks	70	4	265	90 000
Empresa Maderera IMAFEG	-	Timber boards, wood struts and blocks	40	3	217	84 000
Comercio Kintaro	2009	Timber boards, wood struts and blocks, prefabricated houses	40	3	337	110 000
Aserraderos Unidos	2009	Timber boards, wood struts and blocks, prefabricated houses	60	4	190	85 000
Servicios Múltiples Ochoa	1964	Timber boards, wood struts and blocks, coffins	40	5	368	188 000
Maderera YOSECHRIS	-	Timber boards, wood struts and blocks	30	5	194	100 000

- **Servicios Forestales Madre de Dios:** this company, which began operating in 2011, produces shihuahuaco timber decking and boards. The company had sales of US$490 572 in 2014, the year in which it invested US$155 000 in the purchase of the following machinery: two Induspan circular sawmills, a Servic Multilam double shaft saw, three cut-off saws, and two circular saw benches.
- **Servicios Generales Málaga:** this company, which began operating in 2010, produces furniture using cedar, ishpingo and tornillo and construction timber using caspi, misa and quinilla. The company's sales grew from US$31 700 in 2012 to US$40 000 in 2014. In 2014, the company invested US$8100 in the purchase of a planer, a spindle moulder, a jointer plane, a cut-off saw and a joinery bandsaw, as well as in workshop extensions.
- **Alemania SAC:** this company began operating in 2012. It produces cedar and ishpingo commercial timber, as well as shihuahuaco timber decking and boards. The company had sales of US$2.8 million in 2014, and it invested US$45 000 in the purchase of an edge planer and a front loader.
- **Industrial Maderera Blanco:** this company was established in 2006. It produces decking timber and parquetry flooring using ana caspi and shihuahuaco.

Project activities

Training

The project provided more than 150 small timber companies with training through courses, workshops and onsite technical assistance at processing plants on the following topics:

- Technological innovation
- Timber drying
- Furniture finishes
- Value-added timber processing techniques
- Timber grading
- Waste management
- Forest certification and chain of custody
- Financing for forest enterprises
- Production costs
- Occupational health and safety
- Business leadership and management
- Financial management
- Administrative management
- Organization and management of forest enterprises
- Good environmental practices
- Sustainable forest management.

Pilot export

Entrepreneurs in Madre de Dios were given an opportunity to establish closer links with international trade partners through the pilot export of high-value-added timber products, supported by the project. The company selected to participate in this pilot initiative was Pietra Forestal Peru, which makes S4S E4E KD decking boards using shihuahuaco. A total of 69.6 m^3 was exported in three containers through Callao, the main Peruvian port, bound for France for delivery to the client, Etablissements Pierre Henry Et Fils.

Future park: Producers meet on site to discuss the construction of the Yura industrial park in Arequipa. *Photo: C. Acurio*

One of the lessons learned in this exercise was that companies must ensure that all the necessary documentation for the export of their products is up to date, including operating licence, tax registration number and invoices. Moreover, to justify the required investment it is important to ensure that the export of value-added timber products is commercially viable and economically profitable. The stakeholders in the export of timber products need to play an active role throughout the whole process—including the forest authority (SERFOR), the regional government (GOREMAD), the health authority (SENASA), Customs, the National Police Department and the Association of Exporters (ADEX).

Another lesson learned is that, to reach the minimum export volume of at least one container, small and micro secondary timber-processing companies must work collectively to fulfil overseas orders.

Technical assistance

The project strengthened the management capacity of 15 enterprises through the participatory development of business plans and by providing initial technical assistance to support the implementation of those plans.[2]

Industrial park development

In the city of Arequipa, the project promoted the concept of an industrial park for timber producers to help overcome the production infrastructure problems facing timber companies in that city. As a result, Arequipa's regional government agreed to set aside 400 hectares of state-owned land at kilometre 16 on the Arequipa–Yura road for the development of a "techno-ecological" industrial park for micro, small and medium-sized enterprises in the forest sector and other sectors. The construction of the park will help overcome the fragile "survival" condition of companies by providing them with adequate infrastructure, strengthening production chains and helping companies compete successfully in local, subnational, national and international markets. The park is expected to improve the production of highly competitive products, create new sources of employment and invigorate the regional economy.

2 More information on the business plans is available at: www.cnf.org.pe/py_ejecucion/valor_agregado.htm

Converted: A worker at Empresa Maderera Marañon SRL in Pucallpa, Peru marks sawnwood bundles. *Photo: E. Sangama*

Project outcomes

The project achieved its specific objective of increasing the competitiveness of timber products in the central and southern areas of the Amazon Region through the development of higher-value-added products and increased access to national and international markets. The problem tackled by the project was the low competitiveness of timber products due to their low quality, the poor entrepreneurial culture and weak organization of timber companies, and limited government attention to the development of the forest sector.

The outcomes achieved by the project are described below for each of the four project outputs.

Output 1: Timber products produced and marketed in accordance with the quality, quantity and cost standards required by national and international markets

- 30 timber companies made new investments in timber-processing infrastructure.
- 31 timber companies increased their timber product sales.
- 156 timber entrepreneurs were trained in business management, environmental management, technology and financial mechanisms.
- 31 timber companies received technical assistance in technology, machinery and financing.
- 381 people received technical training in business management, environmental management, technology and financial mechanisms.
- 16 technical documents were produced. [3]

Child's play: Mr Gary Céspedes, manager of *Industrias del Machihembrado Daniella*, stands alongside a wooden cubby house manufactured in Pucallpa, Peru. *Photo: E. Sangama*

- Entrepreneurial diagnoses and evaluations of the timber sector were carried out in Ucayali and Madre de Dios.
- Timber products produced in Madre de Dios were exported on a pilot basis.
- The timber company Pietra Forestal Peru SAC exported (on a pilot basis) a high-value-added product—shihuahuaco timber decking S4S E4E KD—from Madre de Dios.

Output 2: Industrialists recognize their entrepreneurial role in the sustainable and efficient use of timber resources

- 30 timber entrepreneurs receive technical training in six courses on topics related to forest and chain-of-custody certification.
- 15 business plans were prepared (one for each company).
- Five information campaigns were implemented on sustainable forest management, forest industries and timber trade in five Peruvian cities: Puerto Maldonado, Pucallpa, Arequipa, Tingo Maria and Lima.

3 Price schedules for forest products and services (January, May, July and October 2013 and April 2014); manual to facilitate "5S" training workshops; chain-of-custody procedural manual; manual on occupational health and safety; industrial safety manual; stacking and loading drying chambers; practical guide for timber drying in conventional kilns; prefabricated houses; and manufacturing of pallets.

- Two videos and dissemination spots were broadcast on the topics covered by the information campaigns.
- One poster, one newsletter, one two-page leaflet and two three-page leaflets were produced, containing thematic information on forest activities.

Output 3: Timber organizations strengthened

- 30 timber companies received assistance in the use of trust-building mechanisms.
- Five associations of small timber companies received assistance in setting up cooperative marketing ventures.
- 153 people were trained in seven courses on administration and organizational issues.
- 27 enterprises received technical assistance in management and administration.
- One institutional website was created, featuring project publications and diverse information on the activities of the CNF.

Output 4: National and regional (subnational) public agencies respond to forest-sector requirements

- A proposal was developed on improving forest-sector transparency and participation in Ucayali.
- A proposal was developed for the construction of a techno-ecological industrial park for micro, small and medium-sized enterprises in Arequipa.
- 50 public officers were trained in six courses on forest products, forest administration and public forest monitoring.
- Three visits were organized to enable forest entrepreneurs and officers to share experiences and knowledge.
- Two forest consensus-building roundtables were strengthened.

Project sustainability

The project was completed in 2016, and, as executing agency, the CNF is now responsible for ensuring its sustainability and follow-up. To this end, the CNF is in constant contact with beneficiary enterprises and local forest organizations, providing them with support on business management through its offices in the project area and, in the case of Ucayali, through the forestry consensus-building roundtable. In addition, new proposals are being developed to improve competitiveness by strengthening the production and business management capacities of producers.

Timber enterprises will be encouraged to bid for non-reimbursable competitive funds promoted by national and local governments to focus on issues such as technological innovation. Such funds include the Research and Development Fund for Competitiveness (*Fondo de Investigación y Desarrollo para la Competitividad*—FIDECOM) and the Initiative for the Support of Production Competitiveness (*Iniciativa de Apoyo a la Competitividad Productiva*—PROCOMPITE). Moreover, projects for the development of industrial parks— especially the Arequipa industrial park—aim to encourage the establishment of secondary timber-processing industries. The CNF also maintains a close relationship with representatives of SERFOR, regional (subnational) authorities and other public and private organizations committed to sustainable forest development and improving the productivity of the timber industry through the production of higher-value-added timber products.

The CNF continues to support the Ucayali consensus-building roundtable, which is now an important partner of, and advocate for, forest-sector interests and enterprises. Coordinating mechanisms have been established with local organizations to continue strengthening the production and entrepreneurial capacities of producers. To this end, courses and workshops continue to be developed, with the support of timber-industry organizations, to ensure that producers have access to training and awareness development programmes. The technical documents produced by the project continue to be disseminated, in both printed and digital forms, and price lists for forest products and services are published regularly.

Publications produced by the project can be found by inserting the project code (PD540/09 Rev.2 (I)) into the ITTO project search function at: www.itto.int/project_search.

More information on the project is also available at: www.cnf.org.pe/py_ejecucion/valor_agregado.html

A capital idea

An ITTO-funded microcredit scheme has shown promise in boosting the efficiency and profitability of small and medium-sized forest enterprises in Indonesia

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Lending assistance: A project officer (left) assists the owner of a small-scale sawmill to fill out an application form to obtain credit under the ITTO-funded scheme. *Photo: Natural Resources Development Center*

Timber forest products make significant contributions to the Indonesian economy through wood processing. On Java, sawmills and wood-panel manufacturers once relied on raw materials from natural forests, supplied by logging concessions. Many such companies are now in decline, however, due to the decreasing wood supply from natural forests. According to data from the Ministry of Environment and Forestry, the wood supply from natural forests in Indonesia fell from 20.5 million m^3 in 2005 to 6.12 million m^3 in 2010; average production from natural forests today is about 5 million m^3 per year.

In recent years, small-scale sawmills and wood-furniture manufacturers in Java have begun to flourish based on a community-managed forest resource, replacing large-scale companies outside Java in their contributions to national forest-based revenues. Community forests are expected to play an increasingly important role as a wood supplier both for domestic processors and export, and they are gaining more attention.

Java's small-scale wood industry is growing rapidly

The Ciamis Regency, located in the eastern part of West Java Province, is a good example of how small-scale wood industries and community plantations can develop together. The establishment of community forests was initiated in Ciamis about 30 years ago under a government programme called GERHAN ("land rehabilitation movement") with the original purpose of rehabilitating degraded land. These forests have become important for communities, which are earning income by planting and harvesting trees on idle lands they own and selling the wood to companies that have developed near the plantations. Ciamis was also the

Community-grown: Customers buy sawnwood from a small-scale sawmill in Ciamis processed from logs harvested in nearby community forests. *Photo: Natural Resources Development Center*

host of an ITTO project[1] in 2006–2008, in which farmer groups received training in the management and technical aspects of community forests, and a nursery for seedling production was established with a production capacity of about 1.5 million seedlings per year. The project helped change the mindset of farmers about the roles and benefits of community forest plantations. The area of community forests increased by 10% per year in Ciamis in the seven years to 2010, with the largest increase (19%) in 2008 (Ciamis Forestry Research Institute 2010).

The impact of GERHAN and the ITTO project can be seen in the increased wood supply from community forests in Java in recent years. In the Ciamis Regency alone, the annual production of timber from community forests is

1 ITTO project PD 271/04 Rev.3 (F): "Rehabilitation of degraded forest land rehabilitation of involving local communities in West Java, Indonesia".

Loan learners: The project team visited small-scale sawmills and other wood-processing enterprises and held field discussions to identify potential loan recipients. *Photo: Natural Resources Development Center*

400 000–500 000 m^3, supplying manufacturers of mouldings, panels and furniture in West and Central Java. Most small sawmills produce semi-processed timber products such as rough-sawn timber from community-supplied timber, and small wood-panel companies produce core sheets for use in blockboard.

The development of community forests has had a significant influence on the growth of small and medium-sized wood-processing enterprises in Ciamis. For example, the number of such enterprises reached 300 in 2009, an increase of 14% over the previous year. According to data from the Forestry and Plantation District Office in Ciamis, there are now at least 393 small sawmills in the regency.

ITTO credit scheme for small-scale wood enterprises

In light of a successful ITTO project (PD 233/03 Rev.2 (I)) in Peru on small-scale financing, ITTO set out to apply a similar approach to small wood enterprises in Indonesia. A memorandum of understanding was signed between ITTO and Indonesia's Natural Resources Development Center (*Yayasan Pusat Pengembangan Sumber Daya Alam*—NRDC) in April 2014, and the project[2] commenced later that year as part of the ITTO Biennial Work Programme 2013–2014.

The project team conducted field visits and held discussions with the owners of small-scale wood enterprises (mostly sawmills with input capacities of 2000–6000 m^3 per year) in Ciamis, facilitated by an officer from the Ciamis Forestry and Plantation District Office. The two main financial obstacles were determined to be a lack of investment capital and a lack of working capital.

Given the limit on the funds that could be loaned under the credit scheme, it was decided to support the industry in resolving its lack of working capital. Most small companies have trouble accessing bank credit and therefore tend to obtain loans from family and friends, money lenders, cooperatives and non-banking financial institutions, despite (with the possible exception of friends and family) higher rates of interest compared with banks—rates can be as high as 3% per month. Thus, many SMEs rely on the uncertain helping hands of others to meet their need for capital.

The ITTO-supported credit scheme for SMEs required that funds were obtained from banks or other financial institutions, with the ITTO project acting as guarantor and the NRDC team performing the role of facilitator by providing technical inputs and recommendations to banks on credit applications by SMEs. The scheme made available a total of US$50 000; credit of about US$15 000 per company was issued, with the aim of managing the scheme as a revolving fund that would provide credit for more SMEs over time.

After intensive consultations with several banks (government-owned and private), the NRDC team decided to collaborate with Bank BRI-Agro, Bandung, West Java branch, for the following reasons:

- The bank's mission is to finance small agribusinesses fairly close to the forest sector.
- The bank has experience in offering credit to small businesses, so an agricultural credit disbursement mechanism already exists.
- The interest rate offered by the bank is very competitive for small business loans.

Implementing the credit scheme

Due to the proliferation of Illegal logging in recent years, the forest industry has been categorized as "not bankable", meaning that banks are wary of lending to wood-processing companies. The International Monetary Fund considered that the forest industry was a main driver of deforestation and that it should therefore be excluded from financing. In 2011, the Bank of Indonesia (Indonesia's central bank) issued a circular letter banning banks from financing investments in the forest sector. Local banks such as Bank BRI-Agro still use this circular letter as a reference in considering microcredit in the forest sector, including for community-based wood-processing enterprises. It may have been the cause of the long process involved in preparing the memorandum of understanding between NRDC and Bank BRI-Agro; it took some time to convince the bank that the funds provided by ITTO could be used as a back-to-back guarantee for loans. Based on this field finding, the NRDC team recommended that the Ministry of Environment and Forestry communicate with the Bank of Indonesia to revoke the circular letter because community forests and the community-based forest industry are now flourishing and playing an important role in economic growth in communities.

The targets of the credit scheme were prioritized as follows:

1) small businesses/small sawmill enterprises that had signed up to obtain SVLK (Timber Legality Verification System) certification;
2) SMEs that process wood from community forests with a capacity of 2000–6000 m^3 per year and needed working capital or investment capital for wood-processing equipment to increase efficiency; and
3) SMEs with legal permissions from the local government but which lacked access to finance.

2 Although called a project in this article, in the ITTO nomenclature it was an activity, namely ITTO Biennial Work Programme 2013–2014 Activity No. 2 (PP-A/49-287): "Demonstration and adoption of credit scheme for small–medium forest enterprises".

The Ciamis Forestry and Plantation District Office provided data and information on SMEs and recommended those that merited credit. The project team ultimately selected two small-scale wood-processing companies (Bintang Timur and Kaindo) in Ciamis to receive credit, and a bank officer followed up with the necessary actions to put the loans in place. A third company, Sumber Kayu, in Cianjur district, was also later selected.

Constraints on banks

Findings from the field indicate that many SMEs desperately need working capital loans but do not meet bank requirements—even though such SMEs play important roles in local economies by, among other things, adding value to wood and generating local income and employment. Of the 393 community-scale wood-processing enterprises in the regency, only nine have complete business permits.

All banks operating in Indonesia must follow the procedures established by the Financial Services Authority (FSA), which supervises activities in the financial services sector and tightly controls the process of extending credit. This is an additional reason why small enterprises are unable to obtain interest rates lower than 8.5% per year: under regulations, banks may only give credit to large companies at about 12% per year; the rate can be lower for small enterprises but not less than 8.5%.

The NRDC team observed that, in the process of lending, many SMEs lack assets in the form of land or buildings that could be used as collateral, as required by FSA regulations. With the back-to-back guarantee provided by the ITTO project, however, the bank was able to be more flexible in its lending requirements while still meeting FSA regulations.

Given the success of the credit scheme for SMEs in Ciamis, the NRDC proposes that it be expanded to enable other SMEs and other regencies in West Java to benefit from it. For example, a prospective company in Cianjur (West Java) that meets the requirements of bank lending procedures is seeking a loan to purchase equipment for producing wood pellets for energy. The NRDC team and the bank are also verifying two timber enterprises—Bintang Timur and Kaindo—in Ciamis that are seeking credit for the purchase of equipment to produce wood pellets (chipper, grinder and pellet press) as business capital. There is demand for wood pellets, not only for export but also domestically from the makers of two types of food, tofu and tempeh (*pabrik Tahu dan Tempe*). The possible follow-up of other candidates depends on the revolving fund from the first three funded SMEs.

The selection process shows that many interesting SMEs could qualify for credit through the scheme, given the greater availability of funds. The credit scheme could be replicated and further developed by other institutions and donors to provide more opportunities for SMEs to grow. The average credit provided to each SME is 150 million Indonesian rupiahs ($12 000), with repayment required within two years at an interest rate of 8.5% per year, which is the lowest rate allowed by the regulations.[3]

3 The remaining funds financed the credit facilitation process or were reserved for bank guarantees.

Small enterprise, small logs: This small-scale sawmill uses timber obtained from community forests. *Photo: Natural Resources Development Center*

Progress of credit repayments

As of the end of 2016, repayments of the loans to Bank BRI-Agro by the two SMEs in Ciamis had been delayed due to a slowdown in the global market; Bank BRI-Agro and NRDC are assisting those two debtors to enable them to pay back the loans in a timely way. The other debtor completed repayments in May 2017, and NRDC now plans to revolve that loan to an SME in another region.

Training

The main determining factors in the competitiveness of timber enterprises are the efficiency of raw-material processing; the quality of processed products; technology innovation; and responsiveness to markets and consumers. The project found that many SMEs in Ciamis and Cianjur perform poorly in processing and product quality; consequently, the project facilitated in-house training for 15 SME managers, with certain criteria applied in selecting the participant SMEs. The aim of the in-house training in Ciamis was to increase skills in efficient wood processing and the production of good-quality timber products, thereby increasing product value.

The in-house training exercise was revealing. For many sawmill managers, it was the first time they had received training of any kind; previously they had worked based on their own experience, and they had not realized the importance of improving the efficiency of raw-material use. After the training, the managers felt that regular training was crucial for developing their companies and improving their competitiveness and sustainability.

In-house: An ITTO consultant delivers training to small-scale sawmill managers in Ciamis, Indonesia, as part of the ITTO project. *Photo: Natural Resources Development Center*

Lessons learned

The ITTO credit scheme in Indonesia generated the following lessons on the importance of increased access to finance for SMEs:

- Many SMEs do not meet the requirements of banks and other financial institutions, and their human resource capacity needs improving.
- SMEs cannot be equated with large companies in meeting banking requirements. They require special arrangements, which should be as simple as possible.
- SMEs need to increase their technical and administrative capacity so that the received credit can be used to improve productivity and their financial administrative processes can meet the minimum standards of financial reporting for business entities.
- Assistance in the first year of credit implementation will greatly help SMEs in improving their performance.
- Small loans can help SMEs in West Java and elsewhere in Indonesia manufacture more efficient and profitable products.
- Access to credit under the scheme has enabled participating SMEs to develop better production processes by purchasing and operating new equipment.

The scheme has strong policy implications for economic development programmes in the forest sector. It is expected to encourage government institutions—especially the Ministry of Environment and Forestry—to take up a similar scheme and implement it at a large scale. If so, SMEs will have more opportunities to improve their management, increase the efficiency with which they use natural resources, and encourage the further development of community forests. Increasing the role of SMEs and community forests as part of an inclusive economy is expected to strengthen rural economies and increase the prosperity of rural communities.

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Changing practices on Amazonian farms

A project in Brazil has convinced participating farmers to move away from the slash-and-burn paradigm

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Comeback: A farmer and project officers inspect a degraded area of farmland in the Capoeira area that is now in the process of recovery after planting with forest species. *Photo: Maricélia Barbosa*

Family farming in the Amazon is generally based on slash-and-burn agriculture. Land is cultivated for a little more than two years, allowed to rest for two years (the "fallow period") to enable natural vegetation to regenerate, and then used again for agriculture, with the land prepared by cutting the natural vegetation, allowing it to dry, and burning it (Schmitz 2007). The sustainability of this traditional practice in the Amazon region is highly debated.

When conducted too intensively, slash-and-burn agriculture can result in a reduction in soil fertility, the silting of watercourses, temperature increases, wildfires and the loss of biodiversity. A loss of soil fertility can have major impacts, ultimately leading to the abandonment of farmlands due to low productivity.

The Amazon region is not infinite, and it is increasingly difficult to open up new areas to farming. Sustainable rural development is urgently needed to ensure social and environmental justice, reduce forest degradation and restore degraded lands. The Brazilian Forest Code approved in 2012 (Forest Act No. 12, 651/2012) highlighted the need to restore degraded areas on farmlands. Planting trees can improve soil fertility; moreover, restoration plantings can make significant contributions to the supply of timber and non-timber products, thus reducing pressure on native forests.

INOVAGRI: a strategic approach to the paradigm shift

Breaking away from long-held traditions can be difficult; in the case of slash-and-burn agriculture in the Amazon, many have tried and failed. The INOVAGRI Project, which began in December 2007 and ended in November 2016, has shown considerable promise, however. The aim of the project, which was funded partly by ITTO[1], was to develop rural production systems based on sustainable family farming practices by taking a cross-cutting, participatory approach. It involved, among others, producer families, the project's technical team, and representatives of rural workers' unions, governmental environmental institutions, public education and research institutions, public and private technical assistance institutions, and financial agents. This article describes the project's main outcomes.

Participating families

The project involved 30 families in three municipalities (Bragança, Capitão Poço and Garrafão do Norte) in the northeast of the state of Pará in the Amazon region. The size of the properties ranged from 25 to 120 hectares, and the average size of the demonstration plots established on each property was 0.34 hectares. This size was proposed by farmers based on the availability of family labour for developing and maintaining the planted area. The total area of the demonstration plots, therefore, was just over 10 hectares.

Earning the trust of farmers

Participation was the mainspring of the project, enabling families, project officers and others to listen to each other, learn new perspectives and work together. Several families became project partners. Various activities, such as courses, trainings and exchanges of experiences, carried out jointly with farmers, were crucial for implementing activities and strengthening partnerships between farmers and the project. Participating farmers developed a sense of ownership of the project and became invested in the tree-planting enterprise. A heightened awareness of the benefits of restoring low-productivity areas on their own lands turned farmers into collaborators.

1 ITTO project PD 346/05 Rev.2 (F).

Trust-building: Joint activities between project officers and farmers, such as this seed-collection exercise, helped build trust and created mutual learning opportunities. *Photo: Vanessa Sousa*

Farmers as important actors

The project came about because of the dire need to return farmlands to production that had been abandoned because of their low productivity after agricultural use. Project activities were planned around the availability of families, because they would play key roles in the activities by providing their time and labour. Families participated fully—from the very first stage of selecting areas for restoration, to choosing the species to be planted, preparing sites, planting, monitoring plant growth, and many other activities.

Mapping farmlands

The mapping of farmlands was especially important for developing a close working relationship between experts and farmers. The first step in this activity was to draw a sketch of a given farm, with the purpose of representing its main environments (or subsystems) on paper. This process involved the full participation of all family members, with children tasked with drawing the sketch. The sketch was the starting point for mapping out the farm, which was done jointly by the head of the household (usually the father) and project staff, often accompanied by children. Data on farm boundaries were collected with the assistance of a hand-held global positioning system (GPS) (supplied by the project).

Understanding farmland ecology

With the GPS data and 3–5-m-resolution satellite images from SPOT (*Satellite Pour l'Observation de la Terre*) it was possible to prepare preliminary versions of farm maps, which were then validated in the field. The validation process was always pivotal. Farmers were excited and interested to "view" their farms from above; they validated the various farm subsystems. Project staff noted that the mapping process empowered and motivated farmers to improve farm management. It is possible to say, therefore, that the farm sketches were crucial tools for deciding which areas were to be restored.

Selecting trees species for planting

The tree species to be planted were chosen in a participatory way. Each family proposed a list of species they would like to plant on their farms—with the Brazil nut tree (*Bertholletia excelsa*) a particular favourite. Other selected species included cedar (*Cedrela odorata*), mahogany (*Swietenia macrophylla*), paricá (*Schizolobium amazonicum*), taxi-branco (*Tachigali vulgaris*) and yellow ipe (*Handroanthus serratifolius*). In most cases, seeds and seedlings were available, although

Overhead: A farmer measures a two-year-old planted paricá (*Schizolobium amazonicum*) seedling. Families were fully involved in monitoring the survival and growth of their trees. *Photo: Paula Vanessa*

Line-up: Project officers explain the best layout for a farm planting in an abandoned pepper plantation area, Pará, Brazilian Amazon. *Photo: Vanessa Souza*

not always in sufficient numbers. Because they were able to choose which species to plant, farmers had a strong desire to protect seedlings after planting. They tended them carefully and monitored their growth.

Arrangements and planting

The spatial arrangement of seedlings was determined by project staff according to the characteristics of the species chosen and the planting sites and indicated on the farm maps. The head of each participating family was supplied with a marked-up map, as well as with the seeds or seedlings for planting. Most sites had already been cleared (although the project did encompass a certain amount of enrichment planting in secondary forests); planting holes were dug in rows according to the arrangement shown on the maps. Each family prepared their own sites and planted the seedlings; in most cases, families grew the seedlings from seed in small on-farm nurseries.

Follow-up planting was performed three months after initial planting to replace any seedlings that had died.

Monitoring plant growth

Plant growth (height and diameter at breast height) was monitored in each farm plot. Seven measurements were made over a 7-year period. Families participated fully in the monitoring, often celebrating when good seedling growth was confirmed.

Agents of change

Farms—and perceptions—are changing

Good tree growth means that, ultimately, products (e.g. nuts and timber) will be available for harvesting in the restored forests. But good growth also means that soil conditions are improving (Poça 2012) and thereby becoming more productive, farms are becoming more pleasant to live on (with lower daytime temperatures due to shading and evapotranspiration), and wildlife is returning (Barros 2014). All participating families have noted positive changes and are proud of the work they have done to achieve this.

The project team noted that producers regularly reported that:

- The project provided a new vision of sustainable production, which increased productivity and improved the quality of products, thereby boosting market value.
- Credit agencies opened up new financing opportunities for producers involved in the project after visits to properties showed positive changes in production.

It is clear, on the ground, that the participatory, cross-cutting approach to knowledge-building in the INOVAGRI project has yielded good results. Training courses and discussions on the restoration of native vegetation have led to increases in overall farm productivity.

Indicators of productivity

Indicators of the positive benefits for farmers, based on project actions, include the following:

- During project implementation, only two families ceased their involvement (both because of a change of residence).

Farm helper: A farmer stands next to a 6-year-old taxi-branco (*Tachigali vulgaris*), a nitrogen-fixing tree planted as part of the project. Trees such as these are bringing environmental benefits to Amazonian farms and boosting agricultural productivity. Ultimately, they will also produce timber and other products. *Photo: Maricélia Barbosa*

- There was increased demand for seedlings to expand planted areas, mainly with agroforestry systems involving cocoa, cupuaçu and açaí.
- Participating farmers have partially or totally abandoned traditional slash-and-burn farming (see below).
- There was increased demand for seedlings of different species to diversify production.

Most participating farmers have abandoned slash-and-burn practices, and those who continue to use this method do so in a more controlled way, causing fewer negative impacts. The project has helped change mindsets, with participating farmers moving away from a longstanding agricultural tradition in the Amazon. These farmers are now agents of change, helping to disseminate and replicate conservation-agriculture practices and sustainable natural resource use (Barbosa et al. 2015). Their farms have become local and national references for other farmers and for the development of public policies. The experiences and lessons learned are being shared with visiting farmers from other regions.

A change is occurring, little by little, towards embracing the cultivation of woody plants for multiple purposes. But growing and monitoring woody plants in farm plots requires a major cultural shift—before the project, it was a practice rarely seen in family farming the Amazon.

A participatory, cross-cutting approach is crucial. Involving all stakeholders, empowering farmers, making use of wide-ranging expertise and showing the benefits of change will help improve public policies and lead to rapid uptake across the Amazon.

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53rd session of the International Tropical Timber Council

Gender equality, green supply chains, the participation of civil society and the private sector, and transboundary conservation were strong themes at the most recent session of ITTO's governing body

By the ITTO Secretariat

Hands up for gender equality: Consultant Stephanie Caswell presents a report on the ITTO policy guidelines on gender equality and empowering women during the 53rd session of the International Tropical Timber Council. *Photo: D. Piaggio/SERFOR*

Presenting the gavel: The outgoing Chairperson of the International Tropical Timber Council, Mr Tabi Agyarko, receives a framed gavel from the incoming Chairperson, Mr Zhang Zhongtian, at the close of the 53rd session of the International Tropical Timber Council. *Photo: Rahmayanti*

The International Tropical Timber Council adopted the ITTO Policy Guidelines on Gender Equality and Empowering Women at its 53rd session, which was held in Lima, Peru, in November–December 2017. The Council, which is ITTO's governing body, meets once a year to discuss issues related to the legal trade of tropical timber and the sustainable management of tropical forests. About 200 delegates and observers attended the session to discuss a range of measures aimed at making progress on both these fronts.

The policy guidelines on gender equality adopted at the session provide a much-needed policy framework for mainstreaming gender considerations in ITTO and will enhance the impact and effectiveness of the Organization's policy and project work, according to consultant Stephanie Caswell, who presented a report on the draft document at the session.

"The United Nations recognizes that gender equality is not only a fundamental human right, it is a necessary foundation for a peaceful, prosperous and sustainable world," said Ms Caswell. Goal 5 of the 2030 Agenda for Sustainable Development recognizes the crucial need "to achieve gender equality and empower all women and girls". This applies equally to the sustainable management of tropical production forests and the promotion of legal value chains and trade, which are core objectives of ITTO.

"Ensuring gender equality is crucial for ITTO to fulfil its mission and mandate," said Ms Caswell. "These guidelines … will provide clear guidance on mainstreaming gender throughout ITTO's policy and project work."

Watch interviews with Stephanie Caswell and Cécile Ndjebet as they talk about the newly approved ITTO Policy Guidelines on Gender Equality and Empowering Women. www.youtube.com/user/ittosfm

New funds pledged

ITTO will have an additional US$2.2 million of funds available for implementing its work thanks to pledges made by donors at the session, intersessional pledges, and an announcement by Germany that it will pledge US$1 million after it completes administrative procedures.

Donors were the United States of America, the Republic of Korea, China, Finland and the Netherlands. The funds will be used to finance several activities in the Biennial Work Programme, which was also approved at the session. The Council also agreed to spend up to US$300 000 from the Working Capital Reserve on a new fundraising initiative, including an ad hoc working group, designed, among other things, to improve ITTO's financing infrastructure and fundraising strategies.

Germany's forthcoming funds will be committed to an activity in the Biennial Work Programme to enhance teak management in up to five countries in each of the three main tropical regions.

Civil Society Advisory Group wants more participation

Danièle Ramiaramanana addressed the Council on behalf of the Civil Society Advisory Group (CSAG), which represents a range of non-governmental organizations and groups and provides ongoing inputs to ITTO's work.

"CSAG continues to be convinced that informal, domestic and regional markets will play an ever-increasing role in the economy of many ITTO producer and consumer countries," said Ms Ramiaramanana. CSAG, she said, therefore encouraged ITTO to give more attention to participatory processes and the empowerment of stakeholders in its project cycle.

CSAG offered its assistance to ensure sufficient social and gender expertise in the evaluation of project proposals. It also "strongly recommended" that the Council include a formal CSAG presentation in its sessions, said Ms Ramiaramanana, to ensure it "takes full advantage of, and benefits fully from, the knowledge, experience and expertise available in CSAG".

CSAG, she said, looked forward to working with ITTO's Executive Director and the Council on issues of interest to CSAG, including sustainable forestry; the legal, transparent and equitable trade of timber and non-timber forest products; gender, and women's empowerment; tenure; community forest enterprise development; and social aspects related to indigenous peoples and local communities, including women.

Watch an interview with Chen Hin Keong, TRAFFIC International, in which he speaks about the role of green supply chains for timber and non-timber products in increasing the value that local people obtain from the use of their tropical forests. www.youtube.com/user/ittosfm

President of Peru opens Council session

Forest message: The President of Peru, Pedro Pablo Kuczynski Godard, addresses the opening session of the Council. *Photo: D. Piaggio/SERFOR*

Conserving and sustainably managing Peru's vast forest resources is fundamentally important for ensuring the country's future, according to the President of Peru, Pedro Pablo Kuczynski Godard.[1]

Mr Kuczynski was speaking at the opening of the 53rd session of the International Tropical Timber Council in Lima, Peru, last November.

"The position of Peru is clear," said Mr Kuczynski. "It is to promote, along with other countries, the conservation of tropical forests, because they provide oxygen and freshwater supply and mitigate climate change. … If we don't protect our tropical forests, it will have a huge impact on future generations."

Mr Kuczynski also spoke about a new Peruvian initiative, Sierra Azul, one of the aims of which is to restore degraded lands in the Peruvian Andes by establishing tree plantations to protect water catchments and generate green jobs in rural communities.

In his speech to the Council during the opening ceremony, ITTO's Executive Director, Dr Gerhard Dieterle, supported Peru's emphasis on forest restoration, calling for a dramatic global increase in the supply of sustainably produced wood products. He pointed out that, without such an increase, the annual deficit in the supply of timber and other harvested forest products worldwide could be several billion cubic metres by 2050.

Scaling up landscape restoration, sustainable forest management and legal and sustainable supply chains was essential to meet this demand, said Dr Dieterle. Moreover, it "could make an enormous contribution to green and inclusive growth, jobs and income".

Other speakers at the opening addressed similar themes. Dr Pablo Benjamín Quijandría Salmón, Peru's Vice-Minister for Agriculture and Irrigation, noted that, despite his country's rich forest resources, the forest sector contributes only 0.9% of gross domestic product. A multisectoral strategic approach was needed, he said, to sustainably develop the country's forests.

Tabi Agyarko, Chair of the International Tropical Timber Council, spoke about the common purpose among ITTO members in promoting the sustainable management of tropical-timber-producing forests. He noted a widening gap between the number of approved project proposals in the Organization and the funds available to finance them, and he called for a focused effort to address this.

Benito Owusu-Bio, Ghana's Deputy Minister of Lands and Natural Resources, informed the Council about recent changes in laws on forests and wildlife in Ghana aimed, among other things, at addressing threats to forests, promoting payments for environmental services, and developing forest plantations.

Watch the opening addresses by the President of Peru, Pedro Pablo Kuczynski Godard, ITTO Executive Director Dr Gerhard Dieterle, and Tabi Agyarko, Chair of the International Tropical Timber Council. www.youtube.com/user/ittosfm

1 Mr Kuczynski resigned as President in March 2018.

Trade Advisory Group backs ITTO's support for green supply chains

Delivering: Barney Chan, co-chair of the Trade Advisory Group (TAG), presents the TAG statement at the Annual Market Discussion on day three of the 53rd session of the International Tropical Timber Council in Lima, Peru. *Photo: D. Piaggio/SERFOR*

The International Tropical Timber Organization should work closely with China and other ITTO members to promote the stable, legal and sustainable supply of tropical timber in China and worldwide, according to ITTO's Trade Advisory Group (TAG).

In a statement issued at the conclusion of the 2017 Annual Market Discussion, held as part of the Council session, the TAG noted "a growing desire in China" to develop green timber supply chains.

The statement, which was presented by TAG co-chair Barney Chan, referred to a roundtable dialogue in September 2017 in Shanghai between 24 large timber companies based in China and ITTO's top management, in which Chinese manufacturers expressed a wish to use legal materials in their products.

According to the TAG statement, all participants at the roundtable dialogue agreed that the aim should be to create a "green-supply-chain mechanism" to promote the stable, legal and sustainable supply of tropical timber, bringing together all stakeholders.

ITTO Executive Director Gerhard Dieterle had earlier referred to the Shanghai roundtable and the proposed green-supply-chain mechanism in his speech to the Council on the opening day of the session.

"We regard this as a significant initiative consistent with the core mandate of ITTO," he said.

Responding to the TAG statement, a delegate from the Government of China indicated her country's support for a green-supply-chain mechanism and requested technical assistance from ITTO in its development.

TAG was established to provide inputs to ITTO's policy and project work. It is open to anyone with an interest in the tropical timber trade, including representatives of tropical forest industries, timber exporters and importers, timber trade and industry consultants, and trade and industry associations.

The 2017 TAG statement also referred to growing wood demand for a range of uses, such as the construction of tall buildings and biomass energy.

"The issue for the private sector is how to galvanize financial resources to create the next wood fibre crops," according to the TAG statement. The statement called on ITTO to set up a working group to guide ITTO's future work on tree plantations.

Plantations set to grow

Plantations were strongly in focus at the Council's 2017 Annual Market Discussion, which was attended by about 150 people from the tropical timber industry, trade, government and civil society. Participants heard from six speakers addressing the theme of "sharing experiences on promoting investment in tropical timber industries and tropical forestry".

Ingrid Nielsen, Head of Investment Advisory and Strategy Consulting in the Indufor Group, reported on a project that helped small-scale landholders in 60 villages in Tanzania establish 15 000 hectares of plantations with an investment of €20 million. Ms Nielsen concluded that "it is possible, it is profitable and it is sustainable" to scale up smallholders in clusters and associations to produce industrial-scale volumes of timber.

Erik Fisher, President of the Forest Committee Association of Exporters, Peru, presented an example of a Peruvian natural-forest concession that was involving local communities, generating employment for 350 people, and stimulating the local economy while also halting deforestation in the area and providing significant biodiversity conservation benefits.

Ivan Tomaselli, President of Brazil-based STCP Consulting and Engineering, showed that Latin American countries with major plantation programmes had the region's most dynamic wood sectors, and he outlined what he saw as the key enabling factors for sustainable forest-sector development.

Bob Tate, Executive Officer of the Papua New Guinea Forest Industries Association, said that the main barrier to investment in his country was policy and political uncertainty.

"The conflict and confusion created by parties with differing development objectives only serves to ward off potential investment in forest industrial development and drives home the message that investors beware—the rules may change at any time and for any reason," he said.

Christian Held, Deputy Head of the Forest Investment Division in UNIQUE Consulting, Germany, suggested that the three main timber production models—natural forests, forest plantations, and silvopastoral and agroforestry systems—were all important for meeting future timber demand. Nevertheless, data from UNIQUE operations in Uruguay indicate that sustainably managed plantations are ten times more profitable than sustainably managed natural forests.

Rik Sools, Deputy Director and Senior Forestry Export for FORM International, the Netherlands, spoke about his company's work in Ghana and Tanzania to attract investments to create about 12 000 hectares of forest plantations. Among the success factors were phased development, the use of a sound, sustainable model that addressed social and environmental issues, high biological growth, and a blend of public and private investment.

Watch interviews with speakers at the 2017 ITTO Annual Market Discussion on how the sector should deal with issues such as legality, sustainability, markets and green supply. www.youtube.com/user/ittosfm

Council launches major report on Emerald Triangle

A report on the progress made in transboundary cooperation between Cambodia, the Lao People's Democratic Republic and Thailand under a long-running project conducted as part of the ITTO–CBD Collaborative Initiative for Tropical Forest Biodiversity was launched at the session.

The aim of the transboundary project is to improve the conservation and management of the Emerald Triangle Protected Forests Complex, part of the Indo-Burma biodiversity hotspot and one of the world's most important centres of biodiversity. The project, which began as an ITTO initiative in 2000, has worked to develop a common transboundary management framework for a group of protected areas along the borders shared by the three countries.

"The Emerald Triangle is one of the most important biodiversity conservation landscapes in Southeast Asia," said Sapol Boonsermsuk, a delegate of Thailand at the Council session and one of the authors of the report.

"It provides habitat for several endangered species and is also home to many people whose livelihoods are highly dependent on the natural resources," he said.

"In a region where few intact forests remain, the importance of this transboundary project cannot be overstated," said David Cooper, Deputy Executive Secretary of the Convention on Biological Diversity, in a video shown during the plenary of the Council.

"The project will enable large endangered mammals such as tigers, serow, banteng and gaur to sustain their populations," he said. "The project is thus a major contribution, not only in the battle against the loss of biodiversity but also the battle against climate change."

The report, *The Bright Green Hotspot: Outcomes of the Emerald Triangle Protected Forests Complex Project, 2000–2016*, is available at www.itto.int/technical_report.

Closing remarks by Executive Director and Chairperson

In the closing plenary of the 53rd session of the Council, Dr Dieterle said that the decisions made at the session (see the box below for a list of these) formed "a solid package to guide us not only for the next year but towards a new future".

The decisions, he said, "will allow us to pursue new initiatives that have great potential to increase the relevance of the Organization as an important player in the forest and climate-change regime. It will allow us to highlight the role of productive forests and green supply chains in green growth."

In closing the session, the Chairperson, Tabi Agyarko, said the Council had faced and dealt with a number of challenges, with delegates coming to consensus on a range of topics and taking strides towards delivering on the Organization's mission.

Nevertheless, said Mr Agyarko, the funding gap between projects submitted and the funding available remains an extremely serious issue.

"We need to take urgent steps to remedy this situation," he said. "I therefore place great hope on the newly established ad hoc working group to address this matter."

A strong ITTO was essential, said Mr Agyarko. "No other organization could fully fill the void that would be created by a weak ITTO."

Mr Agyarko urged delegates to continue to work hard for the success of the Organization.

"In the coming year and beyond, let's work together more closely than ever, to continue our good work and make a difference in the world," he said.

Decisions of the Council at its 53rd session

Decision 1(LIII): Projects, pre-projects and activities

Decision 2(LIII): ITTO Biennial Work Programme for the years 2018-2019

Decision 3(LIII): Administrative budget for the 2018 and 2019 financial biennium

Decision 4(LIII): Extension of the ITTO Strategic Action Plan 2013-2018

Decision 5(LIII): Amendment of Rules of Procedure and Financial Rules and Rules relating to Projects of the ITTO

Decision 6(LIII): ITTO Policy Guidelines on Gender Equality and Empowering Women (GEEW)

Decision 7(LIII): Reconfirmation of further measures regarding the financial impairment

Decision 8(LIII): Application of article 30 of ITTA, 2006 (relief from obligations) to the government of the Central African Republic

Decision 9(LIII): Improving ITTO's financing infrastructure and fundraising strategies

Decision 10(LIII): Rotation in the framework of the selection of the Executive Director of the ITTO

All decisions of the Council, other Council documents, including financial audits, and presentations made to the Council and at the Annual Market Discussion, are available at www.itto.int/ittc-53. The 54th session of the Council will be held in Yokohama, Japan, in November 2018.

Fellowship report

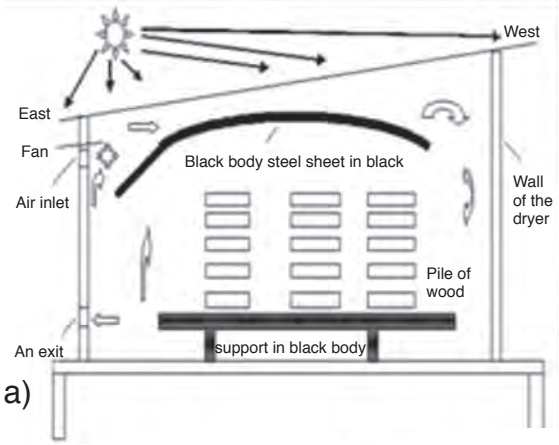
Simple solar dryers adapted to the social, climatic and economic context can help increase the value of tropical timber

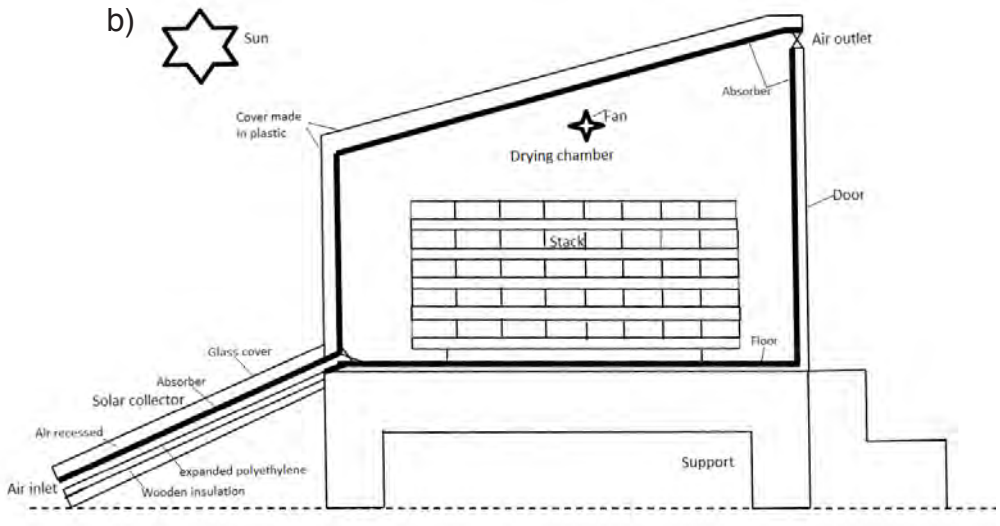
by Merlin Simo-Tagne

Post-Doctoral Fellow, Laboratory of Studies and Research on Wood Materials, Epinal, France (simotagne2002@yahoo.fr)

Dry run: A prototype solar collector being built at the Laboratory of Studies and Research on Wood Materials in Epinal, France, to test its role in wood-drying. *Photo: Merlin Simo-Tagne*

Figure 1: The two indirect solar dryers modelled (capacity = 4 m^3; air speed = 1.5 m per second). (a) MIPROMALO model; (b) model proposed in this study





The use of wood from tropical forests is economically important for humanity in general and local people in particular; for example, timber has long been Cameroon's second most important export product after petroleum. Tropical forests are also crucial for the many ecosystem services they provide. It is necessary, therefore, to maximize the benefits that local people obtain from the sustainable use and management of tropical forests.

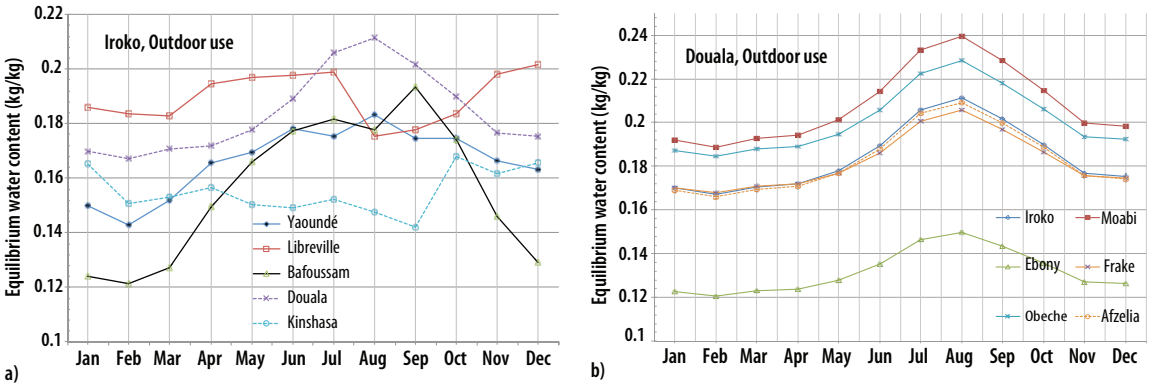
Drying processes can stabilize wood products for long periods, thus adding value to tropical timber and generating greater income for local people. Drying is a process to reduce the moisture content of wood to a level that ensures wood stability, with the desired moisture content a function of ambient air conditions.

Natural drying (also called open-air drying) is the main method used in Cameroon to dry harvested wood; only companies of a certain size use conventional (i.e. powered) dryers. Importantly, few wood processors in Cameroon find it financially attractive to use conventional wood drying because of its cost; in effect, it increases the price of final products, which few Cameroonians are able to pay. Natural drying, on the other hand, has its own costs—such as in storage, wood waste and the long time required for wood to dry. There is another way: solar dryers.

Goal

The study reported here was financed by the ITTO Fellowship Programme and carried out at the Laboratory of Studies and Research on Wood Material (LERMaB) in Epinal, France. It is a contribution to a study of the treatment of boards using solar dryers to increase wood stability. The main goal of the study is to construct low-cost solar dryers capable of achieving the wood moisture content recommended for use in tropical houses.

Figure 2: Equilibrium water content of iroko wood in five cities for outdoor use (a), and six types of wood used in an outdoor environment in Douala (b)



Methodology

Experimental data are available in the literature on the desorption isotherms of six tropical woods: iroko (*Milicia excelsa*), moabi (*Baillonella toxisperma*), ebony (*Diospyros crassiflora*), frake (*Terminalia superba*), obeche (*Triplochiton scleroxylon*) and afzelia (also called doussié) (*Afzelia africana*). We first developed mathematical models for the sorption isotherms of each type of wood, with a view to using them to determine the desired moisture content of wood for the environment in which the wood will be employed. For this purpose, climatic data were obtained from the literature. In addition, we constructed a mathematical model for drying iroko wood that we validated using experimental data on iroko drying kinetics obtained by Cameroon's Mission for the Promotion of Local Materials (MIPROMALO) using a solar dryer without an exterior solar collector.

We modelled and numerically validated an indirect solar dryer for tropical wood using a solar collector, a polyethylene (plastic) cover and a drying chamber with walls and floor made of black materials (see the article by Simo-Tagne et al. 2017— available free online—for more information on the mathematical modelling undertaken; Figure 1 depicts the two solar dryers modelled).

Results

Figure 2 shows that, during use, wood tends to adapt its moisture content to the ambient air conditions and that the usable moisture content is a function of the wood. Thus, to increase wood stability, the drying operation must aim to achieve optimal moisture content according to the type of wood and the climatic behaviour of the ambient environment.

Table 1: Optimal moisture content of iroko wood in outdoor use, five tropical African cities

	Yaoundé	Douala	Bafoussam	Libreville	Kinshasa
Moisture content (kg water per kg dry wood)	0.166 (0.013)	0.184 (0.016)	0.158 (0.026)	0.190 (0.009)	0.155 (0.008)

Note: Standard deviations are in brackets.

Table 2: Optimal moisture content of six African woods, by environment of use, city of Douala

	Environment	Iroko	Moabi	Ebony	Frake	Obeche	Afzelia
Moisture content (kg water per kg dry wood)	Outdoor	0.184 (0.016)	0.208 (0.018)	0.132 (0.011)	0.182 (0.013)	0.201 (0.016)	0.183 (0.015)
	Indoor	0.106 (0.013)	0.118 (0.015)	0.080 (0.009)	0.118 (0.011)	0.122 (0.014)	0.102 (0.014)

Note: Standard deviations are in brackets. The indoor environment is not air-conditioned.

Table 3: Upper and lower bound of optimal moisture content for six types of wood for indoor use, Yaoundé and Douala

		Iroko	Moabi	Ebony	Frake	Obeche	Afzelia
Yaoundé							
Moisture content (kg water per kg dry wood)	Lower	0.117	0.124	0.084	0.123	0.129	0.108
	Upper	0.138	0.155	0.103	0.144	0.156	0.137
Douala							
Moisture content (kg water per kg dry wood)	Lower	0.111	0.123	0.083	0.122	0.128	0.107
	Upper	0.135	0.151	0.100	0.142	0.153	0.133

Note: Indoor environment is air-conditioned.

Light box: The author poses by a section of a prototype solar dryer at the Laboratory of Studies and Research on Wood Materials, Epinal, France. *Photo: Merlin Simo-Tagne*

Figure 3: Comparative drying kinetics of solar dryer types with and without solar collector, airflow = 0.05 kg per second, iroko

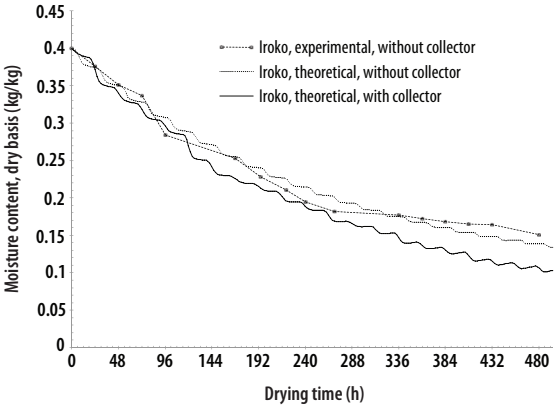


Table 1 shows the moisture contents that—according to modelling—need to be attained for iroko wood for use in five tropical African cities in an outdoor environment. Tables 2 and 3 show the optimal range of moisture content for six tropical woods in outdoor and indoor environments for Douala (Table 2 and Table 3)[1] and Yaoundé (Table 3). It is clear that, even for the same type of wood, the optimal moisture content varies by environment and is lower for indoor environments than for outdoors.

Figure 3 shows that, according to modelling, the solar dryer can obtain a moisture content of 0.122 kg water per kg dry wood for iroko after 500 hours of drying in November in Yaoundé. In the same period, the same city and the same month, the dryer proposed by MIPROMALO obtains a moisture content of 0.148 kg water per kg dry wood (according to both modelling and experimental data). The use of a solar collector and a drying chamber made of a black body makes it possible, therefore, to achieve lower moisture contents for tropical woods than is achievable with open-air drying, making the wood suitable for indoor use. A solar dryer with a laboratory-scale collector is being built at LERMaB to test these findings.

Conclusion

The construction of solar dryers capable of drying boards to their optimal moisture contents for various types of wood and environments would help ensure sustainable forest use by adding value to harvested timber. The dryer proposed here is a solution because its manufacturing cost (at approximately €688, in Cameroon) and the technology involved are within reach of local sawmillers and artisans. Solar drying is recommended for sustainable development because it reduces the environmental impact of timber production using a free energy source.

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1 Note that the values for iroko in an indoor environment in Douala differ between the two tables because Table 2 shows values for a non air-conditioned environment and Table 3 shows values for an air-conditioned environment.

Market trends

Dwindling domestic hardwood supplies could mean growth in tropical-wood imports to Australia, despite recent declines

by John Halkett

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Warehoused: At a time of overall increases in Australia's timber imports, traditional tropical hardwood timber imports are declining. *Photo: John Halkett*

Continuing hardwood supply reductions from domestic native forests in Australia are causing disquiet in timber supply chains. There is a clear downward trend in demand, due partly to changing product preferences and structural product substitution.

The Australian housing market is easing, and this may continue for the immediate future; domestic building activity has dropped by 5–10 per cent since 2015 (Figure 1). This, and a longer-term trend towards apartments rather than detached housing, has implications for the timber industry. Nevertheless, population growth and a housing shortage are likely to mean that, in the medium term, residential building and construction will continue at or above 200 000 housing starts a year. Moreover, the additions and alterations market has a value of about 10 billion Australian dollars a year; such demand-side strength is likely to see hardwood product consumption increase over the medium term. With domestic hardwood log supplies declining, it is likely that imports will increase of darker-colour, medium-density (700–900 kg/m^3) hardwoods sourced from Papua New Guinea (PNG) and Southeast Asia.

Demand-side trends

In the Australian hardwood timber industry, notable factors on the demand side are as follows:

- In long-established hardwood applications, including flooring, there is a strong preference for engineered wood products (EWPs) such as laminated veneer lumber, plywood, and cross-laminated timber rather than traditional solid-timber products.
- There is an apparent shift in demand by timber-product type, driven partly by offsite manufacturing. The importing of prefabricated building components and the emphasis on EWPs is certain to continue. This trend may exacerbate the existing market weakness for traditional hardwood structural and other solid-timber products.

Changing nature of hardwood imports

On the surface, it appears that a combination of tougher legality requirements and innovation in building systems and products is being reflected in both declining imports of tropical hardwood sawnwood (Figure 2) and increasing imports of EWPs, especially plywood, veneered panels and similar complex products (Figure 3). Below the surface, however, the supply situation is more complex. For example, despite the decline in hardwood sawnwood imports, some segments—such as non-coniferous mouldings (Figure 4), which include merbau decking—have seen relatively steady growth.

Future hardwood supplies

Australia's domestic hardwood supply will continue to decline in the short term, with further reductions in hardwood log supply scheduled in the state of Victoria and further reductions likely in northern New South Wales (another Australian state). This is likely to be met by increased hardwood imports, potentially from PNG. The PNG government has announced a policy to terminate hardwood log exports in 2020[1] and to process logs domestically, and some of this processed timber is likely to be shipped to Australia. Moreover, there appears to be no significant impediments on the supply side to continuing—and increasing—hardwood timber-product imports from Indonesia and Malaysia.

This is an edited version of an article that first appeared in *AWISA—The Magazine*.

1 PNG is China's largest supplier of hardwood logs.

Figure 1: Australian residential housing approvals, 2013–2017

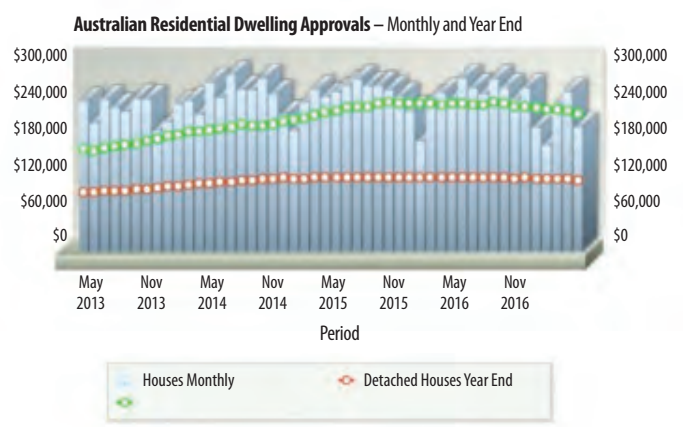


Figure 2: Australian imports of tropical wood products covered by Harmonized System code 4407.2, 2010–2016

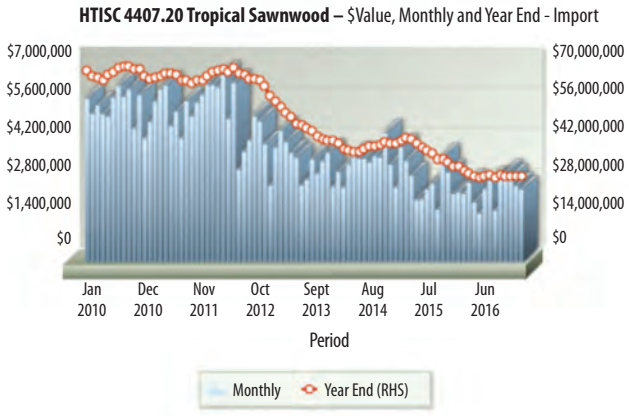


Figure 3: Australian imports of plywood, veneered panels and similar complex engineered wood products covered by Harmonized System code 4412, 2010–2016

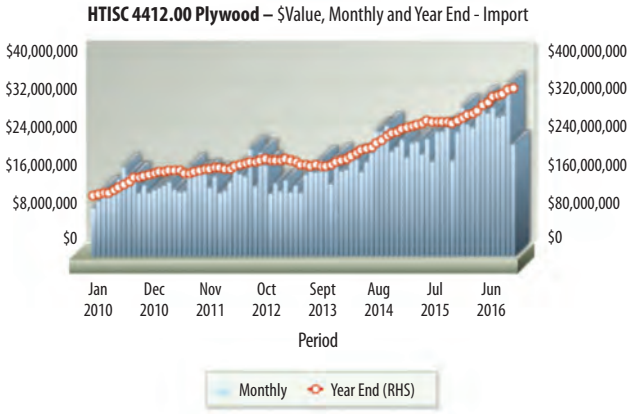
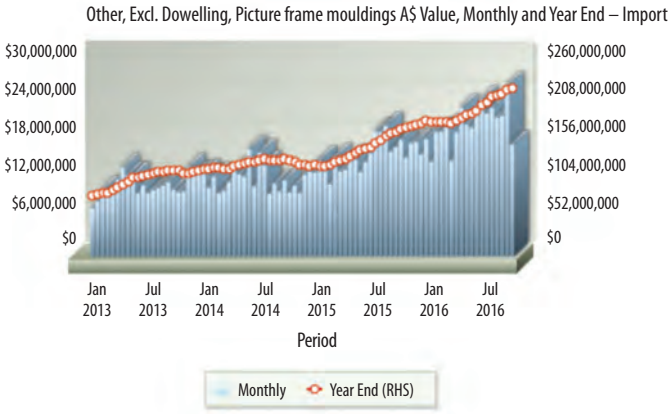


Figure 4: Australian imports of timber products covered by Harmonized System code 4409.29.00.17, 2010–2016



Engineered: The market is showing a strong preference for laminated and other engineered wood products rather than traditional solid timber products. *Photo: Shutterstock*

Tropical and topical

Destruction of nature as dangerous as climate change, scientists warn

The Guardian newspaper recently reported that an assessment by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services released in March 2018 is showing that human destruction of nature is rapidly eroding the world's capacity to provide food, water and security to billions of people. According to the assessment, which is the most comprehensive study on biodiversity in more than a decade, the rate of decline is so steep that the risks posed by biodiversity loss should be considered on the same scale as those of climate change. For example, exploitable fisheries in the world's most populous region—Asia and the Pacific—are on course to decline to zero by 2048, and freshwater availability in the Americas has halved since the 1950s.

More information: www.theguardian.com/environment/2018/mar/23/destruction-of-nature-as-dangerous-as-climate-change-scientists-warn
Unedited advance summaries of the regional assessment reports are available at: www.ipbes.net/outcomes

Carbon price insufficient to outcompete rubber

At current prices, carbon credits cannot compete with profits from felling forests and developing rubber plantations, according to a study published in *Nature Communications* in March 2018. The study found that the expansion of rubber (*Hevea brasiliensis*) plantations is a resurgent driver of deforestation, carbon emissions and biodiversity loss in Southeast Asia. Rubber covered 8.6 million hectares in the region in 2014 (equivalent to 67% of the total area of oil-palm plantations), and rapid further expansion is predicted (an additional 4.3–8.5 million hectares within a decade). The conversion of forests for rubber plantations could be avoided if landowners are paid for the carbon stored in forests at a rate that approaches the opportunity cost of not developing the land for rubber plantations, plus the cost of the carbon finance scheme. Using data from Cambodian forests, the study found that carbon prices of US$30–51 per tonne of carbon dioxide (tCO_2) would be needed to break even against the costs. This amount is substantially higher than the prices currently paid on carbon markets (US$5–13 per tCO_2) and through carbon funds (US$5 per tCO_2). To defend forests from rubber, say the authors, either carbon prices must increase, or other strategies are needed, such as corporate zero-deforestation pledges and governmental regulation and enforcement of forest protection. Another strategy, advocated by ITTO, is the sustainable use of forest resources, including timber, in addition to carbon trading.

More information: www.nature.com/articles/s41467-018-03287-9

ITTO fellowship applications invited

ITTO offers fellowships to promote human resource development and strengthen professional tropical forestry and related expertise in member countries. The next deadline for applications is 10 June 2018 for proposed activities starting from 1 February 2019. To apply online, visit www.itto.int/feature20/#FellowApp, or contact Fellowship Coordinator Ms Kumiko Tanaka at tanaka@itto.int or fellow-application@itto.int.

Shape matters

Using high-resolution satellite data from protected forests in the savanna region of the Brazilian *cerrado*, a study has found that the shape of these forests adheres to a predictable mathematical relationship. In a paper published in *Ecology Letters* in March, a team of scientists led by Laurent Hébert Dufresne found that, due to this relationship, forests tend toward shapes that are neither skinny like a line nor round and smooth like a circle, but more like an octopus or a deformed circle. The team, which included modellers, ecologists and physicists, showed that the relationship holds true for a wide range of areas, from tiny forest fragments to large forest patches. Combining real-world data and modelling, the team determined that fires, which burn easily in the grasslands surrounding forests in the *cerrado* and singe the forests' wet edges, are in constant battle with the forests' expansive growth into grasslands, with the interplay creating forest patches that converge on a steady-state shape. A modelling experiment found that the initial shape of forest patches determines the fate of those patches—whether they expand or contract—over time. Patches of all sizes with compact shapes converged, over time, on the more octopus-like shape, while those with skinny shapes and larger perimeter-to-area ratios collapsed, disappearing into grasslands or fragmenting into very small patches. This finding could help predict the stability of individual forest patches.

More information: https://onlinelibrary.wiley.com/doi/10.1111/ele.12942

Bamboo treatment facility opens in Indonesia

A new bamboo treatment facility that opened recently in East Nusa Tenggara Province, Indonesia, will help local communities boost incomes by adding value to their bamboo products. The facility, which was developed with ITTO's technical and financial support, will increase the longevity of bamboo products using a non-chemical, environmentally friendly preservation treatment. Preservation treatment is a basic step in the industrial use of bamboo, and the opening of the facility is a major boost, therefore, to the local economy. The facility will enable producers to add value to products, thereby increasing employment, market access and rural incomes and promoting the sustainable management of bamboo resources in the region. The treatment facility is an output of ITTO project PD 600/11 Rev.1 (I): "Model capacity building for efficient and sustainable utilization of bamboo resources in Indonesia".

More information: www.itto.int/news_releases/id=5551

Indonesian plywood prices skyrocket

Export prices for Indonesian plywood have climbed in recent months, with prices for 2.5-mm panels at around US$1000 per cubic metre C&F, the highest price ever recorded. *Japan Lumber Reports* says that bad weather in Indonesia, combined with greater control of illegal logging, has cut production by an estimated 50%, thus driving prices up.

More information: www.itto.int/mis_detail/id=5549

Recent editions

ITTO 2017. *The bright green hotspot*. Technical Series No. 46. Yokohama, Japan.

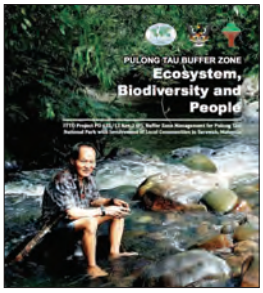
ISBN: 978-4-86507-034-7
Available at: www.itto.int/technical_report

This report presents the encouraging results of a long-running project to improve transboundary management in the Emerald Triangle Protected Forests Complex, a conservation jewel shared by Cambodia, the Lao People's Democratic Republic and Thailand. The report reviews the body of work conducted in the area by agencies in Cambodia, Lao PDR and Thailand under a project conducted as part of the ITTO–CBD Collaborative Initiative for Tropical Forest Biodiversity, a joint programme of ITTO and the Secretariat of the Convention on Biological Diversity.

Van Der Lugt, P. 2017. *Booming bamboo: the (re)discovery of a sustainable material with endless possibilities*. Material Exhibitions B.V., Naarden, the Netherlands.

ISBN: 978-9082755206
Available at: https://boomingbamboo.com

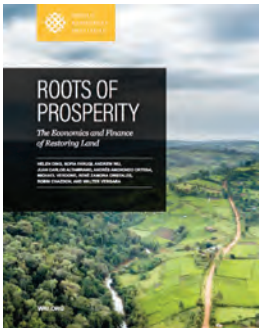
This report provides a comprehensive overview of the enormous potential of bamboo as a sustainable resource—for architecture, design and a multitude of other applications. The book addresses the "bamboo basics" (e.g. growth, properties, cultural history and industrialization), the many benefits of bamboo as a fast-growing, renewable resource, and various ways in which bamboo can be transformed into a wide variety of exciting materials and fabrics.



Chai, P.P.K. 2017. *Pulong Tau buffer zone: ecosystem, biodiversity and people*. ITTO, Yokohama, Japan, and Forest Department Sarawak, Malaysia.

ISBN: 978-967-5880-06-3
Available at: https://goo.gl/uoqWL2

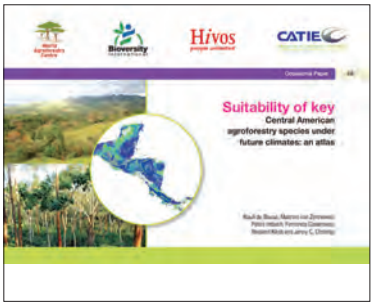
This technical report describes the results of several studies conducted under ITTO project PD 635/12 Rev.2 (F): "Buffer zone management for Pulong Tau National Park with involvement of local communities in Sarawak, Malaysia". The project demonstrated the crucial role that buffer zones can play in providing additional safeguards for core protected areas and securing a resource base for local community use. In this approach the project complemented previous projects in Sarawak focused on biodiversity conservation and livelihood enhancement inside protected areas. The project is the culmination of a long and fruitful collaboration on forestry and biodiversity conservation between Sarawak and ITTO which started in the late 1980s, and this report will further contribute to dialogue on the roles of sustainably managed buffer zones in safeguarding unique protected forest landscapes in the tropics.



Ding, H., Faruqi, S., Wu, A., Altamirano, J.C., Ortega, A.A., Cristales, R.Z., Chazdon, R., Vergara, W. & Verdone, M. 2017. *Roots of prosperity: the economics and finance of restoring land*. World Resources Institute, Washington DC, USA.

ISBN: 978-1-56973-925-9
Available at: www.wri.org/publication/roots-of-prosperity

This report provides a comprehensive analysis of the benefits and costs of restoring forests and landscapes, demonstrating how smart policies and innovative financing can help governments meet their restoration targets. The report finds that private and public finance for restoration is inadequate for seven reasons, and it offers solutions to these financial barriers. The publication also outlines the main steps in carrying out economic analyses, bringing to light the full value of ecosystem services and social benefits as well as the costs of degradation. These insights can help governments develop policy instruments and financing mechanisms to promote restoration on the ground. They can also help stakeholders incorporate environmental and social benefits into financing decisions.



De Sousa, K., Van Zonneveld, M., Imbach, P., Casanoves, F., Kindt, R. & Ordonez, J.C. 2017. *Suitability of key Central American agroforestry species under future climates: an atlas*. ICRAF Occasional Paper No. 26. World Agroforestry Centre, Turrialba, Costa Rica.

Available at: www.worldagroforestry.org/atlas-central-america

This atlas provides habitat-suitability maps for 54 species that are widely used in Central America for shade in coffee and cocoa agroforestry systems. The atlas was developed to support climate-change-oriented initiatives for diversifying and conserving forest genetic resources in Central America. Farmers, scientists and technicians can use it to identify suitable and vulnerable areas for shade species and to develop strategies for climate-change adaptation.

New Assistant Director of Forest Management appointed

ITTO is pleased to announce the appointment of Mr Satoshi Akahori to the ITTO Secretariat as Assistant Director of Forest Management. Mr Akahori, a citizen of Japan, has a Bachelor of Agriculture and a Masters in Social Governance. Previously he worked for Japan's Forestry Agency, where he held a number of posts, including Director General of the Forest Training Institute; Director of the Forest Utilization and Conservation Division; and Director of International Forestry Cooperation. He has also served with FAO.


Photo: Ken Sato/ITTO

Meetings

ITTO meetings

25–29 June 2018
CITES Tree Species Programme Regional Meeting for Asia
Yogyakarta, Indonesia
Contact: johnson@itto.int; milena.schmidt@un.org

ITTO and the Secretariat of the Convention on Endangered Species of Wild Fauna and Flora (CITES) have been working in close partnership for more than a decade to assist countries to implement CITES listings of tropical timber species. This regional meeting, convened under the CITES Trees Programme for representatives of participating Parties, will share experiences on managing CITES-listed tree species and will discuss, among other things, CITES Decision 17.197 on agarwood-producing taxa.

10–14 September 2018
CITES Tree Species Programme Regional Meeting for Central and South America and the Caribbean
Buenos Aires, Argentina
Contact: johnson@itto.int; milena.schmidt@un.org

This regional meeting, convened under the CITES Trees Programme for representatives of participating Parties, will share experiences on managing CITES-listed tree species and will discuss, among other things, paragraph (f) of CITES Decision 16.162 (Rev. CoP17) on *Bulnesia sarmientoi* and *Aniba rosaeodora*.

5–9 November 2018
54th Session of the International Tropical Timber Council and Sessions of the Associated Committees
Yokohama, Japan
Contact: www.itto.int

The International Tropical Timber Council is ITTO's governing body. It meets once a year to discuss issues related to the legal trade of tropical timber and the sustainable management of tropical forests. Council sessions are open to official delegates and accredited observers.

Other meetings

7–11 May 2018
13th Session of the United Nations Forum on Forest (UNFF13)
New York, USA
Contact: www.un.org/esa/forests/events/unff13

8–10 May 2018
Fifth Session of the Intergovernmental Technical Working Group on Forest Genetic Resources
Rome, Italy
Contact: www.fao.org/forestry/86904/en

10–12 May 2018
Sustainable Forest Management for the Future: The Role of Managerial Economics and Accounting
Zagreb, Croatia
Contact: www.sumins.hr/en/iufro-form

21–25 May 2018
International Conference on Ozone and Plant Ecosystem
Florence, Italy
Contact: https://conference2018.wixsite.com/ozoneandplants

29 May 2018
Enhancing the Long-term Competitiveness of the Forest Sector in a Green Economy: Policies for Forest-based Bioeconomy in Europe
Brussels, Belgium
Contact: http://foresteurope.org/event/13498/

29 May 2018
ATIBT General Assembly
Nantes, France
Contact: www.atibt.org/fr

30 May–1 June 2018
Carrefour International du Bois
Nantes, France
Contact: www.timbershow.com

3–9 June 2018
China Wood Industry Tour
Chongqing and Chengdu, China
Contact: https://danaevents.co.nz/2018china

5–8 June 2018
Natural Resources, Green Technology and Sustainable Development/3-GREEN2018
Zagreb, Croatia
Contact: www.green2018.sumins.hr

10–16 June 2018
North American Forest Soils Conference: International Symposium on Forest Soils
Quebec City, Canada
Contact: www.cef-cfr.ca/index.php?n=Colloque.NAFSC-ISFS2018

11–13 June 2018
Small-scale Forestry Conference 2018
Vaasa, Finland
Contact: www.uef.fi/en/web/ssfo2018

20–22 June 2018
4th International Conference on Reforestation Challenges
Belgrade, Serbia
Contact: www.reforestationchallenges.org/Reforestation_Challenges_Conference_4.php

20–22 June 2018
Gabon Wood Show
Libreville, Gabon
Contact: http://gabonwoodshow.com

25–26 June 2018
54th Global Environment Facility Council Meeting
Da Nang, Viet Nam
Contact: www.thegef.org/events/54th-gef-council-meeting

25–27 June 2018
Global Bamboo and Rattan Congress 2018
Beijing, China
Contact: www.barc2018.org

9–18 July 2018
High-level Political Forum 2018
New York, USA
Contact: https://sustainabledevelopment.un.org/hlpf/2018

11–12 July 2018
Land-use/cover Change Drivers, Impacts and Sustainability within the Water-Energy-Food Nexus
Chania, Greece
Contact: http://lulc.earsel.org/workshop/2018-lulc-ws

16–20 July 2018
COFO 23: World Forest Week
Rome, Italy
Contact: www.fao.org/about/meetings/cofo

20–26 July 2018
Twenty-fourth Meeting of CITES Plants Committee
Geneva, Switzerland
Contact: www.cites.org/eng/news/calendar.php

5–9 August 2018
Workshop on Tree Resistance to Insects and Diseases: Putting Promise into Practice
Mt Sterling, USA
Contact: https://treeresistance2018.ca.uky.edu

7–25 August 2018
XXX International Intensive Course on Diversified Management of Natural Tropical Forests: Management in the Face of Climate Change and Forest Landscape Restoration Challenges
Turrialba, Costa Rica
Contact: capacitacion@catie.ac.cr

14–18 August 2018
11th World Bamboo Congress
Xalapa, Mexico
Contact: http://worldbamboocongress.org

20–23 August 2018
World Conference on Timber Engineering 2018
Seoul, Republic of Korea
Contact: http://wcte2018.kr

29–30 August 2018
Aerial Fire Fighting Asia Pacific 2018
Wollongong, Australia
Contact: www.aerial-firefighting-asia-pacific.com

4–6 September 2018
Global Forestry Crime Conference
Lyon, France
Contact: environmentalcrime@interpol.int

4–6 September 2018
12th World Congress on Biofuels and Bioenergy
Zurich, Switzerland
Contact: https://biofuels-bioenergy.conferenceseries.com/europe

17–19 September 2018
Woodfiber Resource and Trade Conference
Durban, South Africa
Contact: https://events.risiinfo.com/wood-fiber

17–21 September 2018
Managing Eucalypt Plantations under Global Changes
Montpellier, France
Contact: https://eucalyptus2018.cirad.fr

24–27 September 2018
African Forest-related Policy and Politics
Yaoundé, Cameroon
Contact: http://pfbc-cbfp.org/events_en/events/forest-related-politics.html

25–28 September 2018
New Frontiers in Forecasting Forests 2018
Stellenbosch, South Africa
Contact: http://conferences.sun.ac.za/ff2018/NFFF2018

1–5 October 2018
70th Meeting of the CITES Standing Committee
Sochi, Russian Federation
Contact: www.cites.org/eng/news/calendar.php

1–5 October 2018
Adaptive Management for Forested Landscapes in Transformation
Posadas, Argentina
Contact: sandra.luque@irstea.fr

3–7 October 2018
2018 Society of American Foresters National Convention
Portland, USA
Contact: www.eforester.org/safconvention

11–13 October 2018
Expo Forestal 2018 +Biodiversidad+Tecnología +Productividad
Guadalajara, Mexico
Contact: www.expoforestal.gob.mx/portal

21–29 October 2018
13th Meeting of the Conference of the Contracting Parties to the RAMSAR Convention on Wetlands
Dubai, United Arab Emirates
Contact: www.ramsar.org/event/13th-meeting-of-the-conference-of-the-parties

5–9 November 2018
5th International Conference on Forests and Water in a Changing Environment
Valdivia, Chile
Contact: www.iufro.org/download/file/27548/6130/valdivia18-ForestsandWater2018-1st-announcement_pdf; forestsandwater2018@uach.cl

ITTO provides this list of international meetings as a public service but is not responsible for changes in date or venue or for other errors.