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

All is not lost

Despite the best efforts of many, tropical forests continue to be cleared (although there are signs that the rate of loss is decreasing). Inevitably, this means lost biodiversity, the emission of previously stored greenhouse gases, and the diminution of many ecosystem services. Nevertheless, there is cause for hope. In this edition of the TFU, ITTO's new Executive Director, Dr Gerhard Dieterle, speaks about the potential of forests to address global challenges, and ITTO's role in this.

Dr Dieterle believes that productive forests—forests harvested sustainably for their many products—will be crucial for mitigating climate change and stimulating green growth. He says that bottom-up approaches involving motivated communities are providing durable examples of landscape restoration and sustainable forest management at work.

Inside: The importance of productive forests; protecting wetlands; remnant trees; Benin's new forest information system; livelihoods in Cambodia; more

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Cover image: The rural landscape in the Sierra de Los Tuxtlas mountain range in Veracruz, Mexico, which was once almost fully forested. *Photo: G. Sanchez Vigil*

Image above: Community members in Kratie Province, Cambodia, receive classroom instructions on high-yielding agroforestry techniques, which they will later put into practice in demonstration areas in the field. *Photo: Hem Chanrithy*

... Editorial continued

Among other things, says Dr Dieterle, ITTO can help increase the share of investment going into forests and build capacity in the forest sector to move towards SFM and sustainable forest products.

Even when deforestation occurs, the ecological impacts can be lessened through good practices. Two articles in this edition arising from work conducted in the largely deforested coastal landscapes of the Gulf of Mexico make a case for improving the management of remnant trees and forests to maintain vital ecosystem services.

Patricia Moreno-Casasola and Adolfo Campos (p. 8) address the often-overlooked role of freshwater wetlands in storing water, which can contribute significantly to mitigating the effects of flash floods and increasing the reliability of freshwater supply. The authors say soil properties in wetlands are degraded by conversion to livestock pastures and development, with a high risk of reducing water and carbon storage capacity. Protecting these ecosystems is vital for landscape functioning, say the authors.

Sergio Guevara Sada (page 11) investigates the role of remnant standing trees and vegetation as landscape connectors. Biodiversity is still high in the region despite widespread deforestation, which Guevara attributes to the connectivity provided by forest remnants, hedgerows and solitary trees. For example, research has found that 98 species are represented among solitary trees still standing in otherwise deforested land in the Sierra de Los Tuxtlas mountain range. These trees provide habitat for birds and bats, which play crucial ecological roles in such denuded landscapes by spreading the seeds of native plants. Mature solitary trees, therefore, form "regeneration nuclei", increasing the potential for forest restoration on abandoned land. It is important now, says Guevara, to ensure that mature trees are well managed as a way of maintaining landscape connectivity.

Other articles in this edition go in different directions. Achille Orphée Lokossou and co-authors (page 15) outline the establishment of a forest information management system in Benin, an outcome of an ITTO project. The system was put in place through a participatory process involving institutional stakeholders and the private sector. According to the authors, the project has increased the ability of the forest administration to collect, manage and disseminate data on the forest sector to improve transparency and decision-making processes, although further capacity building is needed to ensure the system's sustainability.

The aim of an ITTO project in two provinces in Cambodia, as reported by Eang Savet and Hwan-ok Ma (page 19), was to strengthen the capacity of the Cambodian Forestry Administration in forest law enforcement and governance. The project had three main outputs, but the article focuses on a component designed to provide local people with incentives to uphold forest laws by providing livelihood options. The project trained local community members in nursery development, agroforestry and forest-based business development. This has equipped local people with skills to improve their livelihoods and to make sustainable use of land being made available under the government's community forestry programme.

Finally, Daniela Requena Suarez presents the outcomes of research she conducted in the Peruvian Amazon with the assistance of an ITTO Fellowship. She studied tree species in the genus *Dipteryx*, known locally as shihuahuaco, a genus that has seen heavy population declines due to increasing timber demand. People in the study area collect shihuahuaco seeds to eat and more recently also for sale to companies, which have established shihuahuaco plantations in the area. Requena surveyed shihuahuaco seed collectors to better understand the dynamics between the plantation and collectors and the implications for conservation. One of Requena's conclusions is that community engagement can contribute to shihuahuaco conservation by encouraging sustainable seed collection, the protection of shihuahuaco seed trees, and the tending of saplings on lands owned or otherwise managed by local people.

Findings along these lines are often found in articles presented in the TFU. All is not lost in the effort to attain sustainability in damaged tropical forest landscapes: local people, armed with ecological knowhow, can restore and maintain many of the values of tropical forests when they have sufficient incentive to do so.

Productive forests: an undervalued resource for realizing climate benefits and green growth

An interview with ITTO's newly appointed Executive Director, Dr Gerhard Dieterle

Listening to the locals: Dr Dieterle (second from left) talks with local farmers and foresters in restored forest in Guatemala. *Photo: G. Dieterle*

TFU: Congratulations on your appointment. Coming in fresh to ITTO, what do you see as its main strengths?

Dr Dieterle: ITTO has a long history of successful work, and my task is to ensure that this work continues and contributes to strengthening the Organization in light of evolving developments in the international forest dialogue. In the last decade, this dialogue has focused to a large extent on the role of forests in climate change and, in many ways, using forests for productive purposes has been seen more as a contributor to climate change than as part of the solution. But I clearly see that this opinion is gradually changing because new evidence[1] shows that productive forests and harvested wood products can make a huge contribution to climate-change mitigation and adaptation if based on sustainable forest management (SFM) and use. We literally look at the afterlife of trees because their products can substitute for carbon-dioxide-intensive, non-renewable materials and products and can store enormous amounts of carbon in long-lived products. ITTO is the premier organization with a clear mandate from the International Tropical Timber Agreement [ITTA 2006] to make the case for productive forests at the international level.

As a forester working both locally and internationally for 35 years, you have observed many forests and forest communities worldwide. What common lessons have you learned from these experiences in achieving SFM?

I am fortunate to have seen forest management systems in temperate zones, such as Russia, Eastern Europe and Central Asia, and in the tropics in Africa, Asia and Latin America. I have seen a lot of examples of success and failure, and I have learned that there's no single formula for success in SFM. Success depends heavily on local circumstances and favourable combinations of factors, such as land tenure, but, just as importantly, on readiness for change. This is often forgotten—change needs leadership and champions on the ground.

I have seen many well-articulated approaches from governments to local communities, but I think the bottom-up approach, from local to regional and global, is equally important. It is in the latter situation where I have seen the most lasting examples of SFM, working with local communities engaged under an enabling framework provided by the government. I have seen examples of this in Mexico, Africa and China, where motivated farmers or communities on the ground have become proactive partners in implementing innovative approaches in the field. When they see a concrete benefit, they don't mind investing their own resources and will commit themselves to the task because a small increase in income makes a big difference to them. In many cases, secure land tenure and the security of the surrounding areas makes the difference between

1 Tennigkeit, T., Streck, C., Gromko, D., Haupt, F., Held, C., Meier, E. & Pistorius, T. 2017. *Harnessing the potential of private sector engagement in productive forests for green growth.* International Bank for Reconstruction and Development/The World Bank, Washington DC, USA.

success and failure. I have seen very well-structured and well-designed projects that failed to create ownership on the ground, and the desired results were very difficult to achieve.

I have learned that the values of local people are important. Local communities don't look at their resources as commodities—forests are an integral part of their lives, and they are proud of it. It is not about money alone, it is also about values and culture.

We always talk about local communities in a general manner, but they can be extremely diverse. I see some big challenges in the future because of climate change: in extreme situations, climate change will require mobility on the ground, and people will be tempted to move to places more suitable for earning a living but where other communities have already settled, and this could create conflicts. So I think it will be important to help people stay where they are by ensuring the provision of good living conditions. Therefore, ITTO should not look at forests in isolation; poor communities depend on resources around their homes, so we need to take what today is called a landscape approach, which includes agriculture, agroforestry and non-timber forest products—the wider landscape in which farmers make their livelihoods. Internationally, the Global Partnership on Forest and Landscape Restoration is showing us the right direction.

We should also talk about the private sector. In many cases, the private sector is not formally organized; some may refer to it as "illegal" but I would say it's informal, and it is here where there is important work for ITTO to help integrate small and medium-sized enterprises and family enterprises into the formal economy. This will contribute to national economic development and stable structures on the ground. So the private sector is not only about international trade; the main task in front of us is to look at domestic issues and to help governments and the private sector develop a stable and more sustainable forest economy.

At the World Bank you were closely involved in the development of the Forest Investment Program (FIP) and the Dedicated Grant Mechanism for Indigenous Peoples and Local Communities under the Climate Investment Funds and the World Bank Forests and Landscapes Climate Finance Unit. Please outline the scope of these new bodies and the role they can play in bringing about SFM in the tropics.

The Climate Investment Funds and more specifically the FIP is a response to ongoing discussions and issues related to the role of forests in climate-change mitigation and adaptation. I was one of the designers of the FIP, and the strategy behind it was to ensure that climate change is not seen in isolation from development issues. This was an outcome of the 13th Conference of the Parties to the United Nations Framework Convention on Climate Change [UNFCCC] held in Bali, Indonesia, in 2007.

Owner–manager: A local resident in South Africa stands in front of her eucalypt plantation. Bottom-up approaches involving motivated communities are providing durable examples of SFM at work. *Photo: G. Dieterle*

When I looked at ongoing initiatives in the context of forests and climate change, I saw that many valued only the carbon aspect of forest management. For local communities, however, and for the needs of societies, we cannot avoid looking at productive uses. We know that, in the future, there will be a widening supply gap in harvested wood products reaching billions of cubic metres per year. A leading concern is that if we are unable to meet the future demands of people for harvested timber products and wood-based energy, all other efforts to protect forests and recognize their carbon value in performance-based payments will be unsuccessful. We need a strategy to link climate-change mitigation with green and inclusive growth.

Another thought on the development of the FIP was that many drivers of deforestation and forest degradation are outside the forest, and that's why we need to look outside the sector and provide incentives and other mechanisms to integrate agriculture, mining, infrastructure and urban development into concepts that are climate-smart and forest-friendly. For the first time, the FIP opens up that possibility and, for that reason, it's innovative. In this logic, the FIP allows three major types of investment: 1) capacity building; 2) investment in forests—restoration and forest management; and 3) investment outside forests—to reduce pressure on forests. After a slow start, the third type of investment has become an important aspect of the protection and sustainable management of resources in forested landscapes. In Ghana and Côte d'Ivoire, for example, collaboration has been established in the cocoa sector; in Mexico, FIP investment is creating common databases for subsidies and incentives for agriculture and forestry that are not contradicting each other; and, in Brazil, FIP investments, through land cadaster and training in climate-smart practices, are helping farmers meet legal requirements to access funds for climate-smart investments through the Sectoral Plan on Agriculture and Climate Change.

I am very enthusiastic about the emerging results of the Dedicated Grant Mechanism for Indigenous Peoples and Local Communities. It is an innovative approach. It gives

Carbon store: The use of wood in long-term products, such as in this house in Honduras, is a way of storing carbon and substituting for other non-renewable building materials, thereby helping mitigate climate change. *Photo: G. Dieterle*

indigenous peoples and local communities the opportunity to define and articulate programmes tailored to their own needs and, at the same time, to make climate-smart decisions on the use of their resources that result in climate-change mitigation and adaptation outcomes. It has been a big experiment to give the decision-making power to local communities and indigenous groups, and it's amazing to see how fast, well-organized and motivated these groups are in handling the opportunity and how constructive they have been in building their own programmes: the local-to-global approach matters.

I think the FIP fills an important gap in the architecture of REDD+ between readiness through capacity building, knowledge and instruments for monitoring climate change on the one side and performance-based payments for carbon on the other. Without this middle piece of upfront finance, the other objectives of REDD+ are difficult to achieve. I think ITTO can play an important role here in fighting the poor image of harvested tropical wood products and to make the case for the sustainable use of forests—integrated systems of variable size that are productive, locally adapted and integrated into landscapes.

Looking ahead to, say, 2050, describe what you think is an "optimistic" scenario for tropical forests and the tropical forest sector. How do we get there?

Forests will not have disappeared. We will have a lot of forest resources in 2050, but they will be managed in a different way. I see the need for a larger share of forests with higher productivity than today because we need to meet the demands of the future. They will comprise an integrated system of community forest management and larger-scale investments for mass products such as pulp and paper and construction timber. If we don't intensify productivity, the protection of large tracts of forests unique for their biodiversity, cultural and recreational values will not be possible. Forest development has to be done through integrated landscape planning and jointly defined land uses in wider landscapes. I think we are at the beginning of that development in the tropics. Forests cannot be everywhere; we will have some ongoing deforestation—which is inevitable due to population growth and the ever-increasing demand for food—but we need to make smart decisions on where to produce food and where to conserve forests. If you look at the history of Europe, for example, forests were depleted and degraded at a dramatic scale at the beginning of the nineteenth century; today, many European countries have a forest cover equivalent to that last seen in the twelfth or thirteenth century.

One quality of forests is that they can regenerate, which means that it is important to make every effort to avoid a phase of irreversible devastation and degradation. Given today's knowledge and modelling capacities, I am confident that we can find compromises among the various interests. We need land-use planning so that forests with protective functions are retained and agriculture is focused on suitable fertile and accessible lands. We don't know all the potential uses of the forest gene pool; for this reason alone, the gene pool needs to be conserved. Based on existing background scenarios I predict that, in 2050, we will have about the same area of protected forests, a smaller area of multiple-use forests, and a larger area of planted forests, which will be responsible for a much larger share of forest production.

Solid work: A worker inspects a lumber stack at a community forest enterprise in Mexico. Dr Dieterle thinks ITTO can play an important role in improving the image of harvested tropical wood products and to make the case for the sustainable use of forests. *Photo: G. Dieterle*

What do you think the international community should be doing to increase the area of tropical forests under SFM? What is ITTO's role in such an effort?

I think ITTO's role is to increase the share of investments going into forests. In many cases, governments—for fiscal and financial reasons—are unable to provide suitable incentive mechanisms for forest production and investments in forestry that lead to sustainable outcomes. ITTO—in collaboration with partner institutions such as the World Bank, FAO, IUFRO and CIFOR[2]—has a privileged role to play in developing such incentives. It would be a wise investment by the donor community in rewarding countries that provide incentives to the private sector at all levels to invest in SFM, and it would help make such incentives cost-neutral for financially strapped tropical countries. Such incentive mechanisms could be designed to bring companies from the informal to the formal sector, and they could have stimulating effects in creating sustainable approaches, greener products and positive economic impacts and incomes in rural areas. The role of ITTO should be concrete and direct by providing knowledge and capacity building to private-sector companies and governments to move towards SFM and sustainable forest products.

The tropical timber trade can be an agent of economic development, and it can provide an incentive for the sustainable management of natural tropical forests. To what extent is it achieving these outcomes, and what needs to be done to increase its positive influence? What is ITTO's role in such an effort?

Broadly speaking, I see the role of the tropical timber trade in the context of other commodities such as palm oil, beef and soy, and there have been some positive developments, such as "deforestation-free commodities and supply chains", we can learn from. The supply of tropical timber to international markets has changed dramatically in recent years, and procurement policies in consumer countries are bringing about a shift in priorities in producer countries. With initiatives such as the European Union Timber Regulation, FLEGT[3] and related voluntary partnership agreements in a number of countries, the Lacey Act, and new legislation in Australia and Japan, to mention a few, more sustainable practices and proof of legality will become increasingly the norm in international timber trade, and ITTO has a role to play here to prepare our members for it. On some fronts, particularly in developed countries, the use of tropical timber is still regarded as a cause of degradation and even deforestation, but, as I mentioned, there's new evidence that the use of tropical timber can have a climate mitigation role and can support climate-change policies while at the same time contributing to growth, livelihoods and employment in rural areas. ITTO should focus on capacity building, guidance and awareness-raising to increase the acceptance of sustainably and legally produced tropical timber and its daily use. For that, harvested wood products must be tracked and traded within legal and verified supply chains so that the final consumer has full confidence in what he or she buys.

ITTO's project portfolio and policy work have decreased in recent years. Will you be seeking to reverse this trend and, if so, how?

There are several reasons for the decline in ITTO's project portfolio. One of them has been the international focus in recent years on the role of forests in climate-change mitigation and adaptation, with its strong emphasis on avoiding deforestation and rewarding the protection of standing trees.

ITTO has also seen difficult years in the context of its internal management of funds, and my task is to rebuild trust and confidence in the Organization by collaborating with all members—donors, consumers and producers alike. I strongly believe we will manage to get ITTO back to its previous levels and beyond. This recovery can be achieved by designing strategic programmes linked to the UN Strategic Plan for Forests 2017–2030, which is connected with the Collaborative Partnership on Forests [CPF], in which ITTO works strongly with other partners. ITTO is a specialized organization and doesn't necessarily have the capacity to address all forest issues; it needs to integrate itself with the international forest regime on the basis of a more proactive communication and outreach strategy. In many groups and organizations, the use of tropical timber is seen in a negative way because of its perceived links to corruption, inequitable land tenure

2 Food and Agriculture Organization of the United Nations (FAO); International Union of Forest Research Organizations (IUFRO); Center for International Forestry Research (CIFOR).

3 Forest Law Enforcement, Governance and Trade initiative.

From little things: A worker pricks out seedlings in a forest nursery in Guangxi, China. Dr Dieterle believes there will be a large area of forests in 2050, managed differently compared with today. *Photo: G. Dieterle*

and a lack of governance. The challenge for us will be that, in light of the drastic increase in the global population by 2050 and changing consumption patterns, the production of tropical timber needs to be increased in a similar way to avert the risk of additional pressure on remaining forest resources or a massive shift towards non-renewable, carbon-intensive materials and energy. ITTO can be a leading international organization in supporting this process by promoting increased investment in forests and trade at the domestic and international levels.

What are the main opportunities for ITTO to increase its capacity to achieve its mission?

ITTO has a long history of successful, widely recognized work, such as providing guidelines and technical support for tropical timber producer countries, and it is a great forum for dialogue. Its main advantage, I think, is a strong sense of ownership among its members, a distinct feature that I want to support and nurture.

After 30 years of the Organization's operation, the world has changed, and ITTO needs to take into account international developments such as the Sustainable Development Goals [SDGs], the UN Strategic Plan for Forests 2017–2030, the UNFCCC, the Paris Agreement, the Aichi Biodiversity Targets, and so on. The task ahead is to translate the ITTO work programme so that it closely supports those overarching policy frameworks. My focus will be to promote the demand for sustainable and legal products, the consumer–producer relationship, sustainable supply chains, and the legality of timber trade, because all these aspects provide a direct justification for SFM. Considering the new evidence that the consumption of sustainably produced timber and wood-based energy can make a major contribution to the SDGs—especially those related to climate and biodiversity—we will be able to increase ITTO's role in the future. No other organization has a clearer mandate to make this link between producers and consumers, and no other international agreement covers that gap more efficiently than the ITTA.

What are your immediate priorities now you have assumed office?

My utmost concern is to establish an atmosphere of trust in close collaboration with all ITTO members, and to make the Organization a bridge between producers and consumers.

I also know there is a rich body of experience inside ITTO and an extraordinary talented and motivated staff. My immediate priority is to learn as much as possible from the staff, establish trustful and productive working relationships, and motivate them to work as a team. I come from a long career of work in the field, in headquarters, in strategies, in technical work and in research, and I'll bring new ideas to complement the existing expertise. The combination of both will bring innovation and forward-thinking outcomes, so that ITTO can regain its leadership role in the international forest regime.

The forgotten wetlands

The protection and restoration of degraded freshwater swamps and marshes in Veracruz, Mexico, would help mitigate flood peaks and provide a reliable supply of freshwater

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Precious: A freshwater swamp dominated by *Annnona glabra*, Veracruz, Mexico. *Photo: G. Sanchez-Vigil*

Soils are often thought of only for their role in agricultural production, but they provide societies with other benefits, too: crucially, they retain and filter freshwater and protect against flooding in coastal zones. Soil water retention is defined as the capacity of soils to capture, store and release water. Water from precipitation and artificial irrigation infiltrates the soil and is stored in its "pores". Water not stored in the soil runs over the soil surface and recharges streams and rivers, contributing to the maintenance of ecological flows in surface water bodies. Soil and water interact constantly.

This article presents data on the crucial role of soils in freshwater retention in coastal ecosystems in Veracruz, Mexico, obtained as part of ITTO project RED-PD 045/11 Rev.2 (M): "Environmental assessment and economic valuation of ecosystem services provided by coastal forests (mangroves, flooded forests, tropical forests and thickets on dunes) and their agro-replacement systems in the central coastal plains of Veracruz, Mexico".

The importance of soils for freshwater

Water is the basis of all life on Earth, but only 3.5% of the total water volume on the planet is fresh. Freshwater is stored at the poles and in glaciers and permafrost (69.6%); groundwater (30.1%); soil moisture (0.05%); atmospheric humidity (0.04%); lakes and rivers (0.26%); and marshes and swamps (0.03%). Biological water—water that forms part of living beings—accounts for 0.003% of the planet's freshwater (Shiklomanov 1993).

Soil is a porous material generally composed of mineral particles (sand, silt and clay), organic matter, water and air. Water is stored in the connected network of pores, cracks and fissures that form in the solid fraction of the soil, and it also flows through soil profiles to aquifers. Water will accumulate on or move along the surfaces of soils (flood or runoff, respectively) when unable to flow into saturated subsoils or prevented from doing so by impermeable materials such as rock or compacted layers created by anthropogenic activity (Kutílek & Nielsen 1994). In wetland soils, water storage capacity is the space available for retaining water, and it is a function of the upper level of the watertable: the higher the water level, the lower the storage capacity of a wetland.

The ability of soils to retain water is related to their texture, structure, organic matter content and the way they are used, all of which determine their ability to capture, retain and release water. Organic matter is fundamental to a soil's ability to retain water because it favours infiltration and water circulation within the soil by stabilizing aggregates. Soil fauna is also an important factor in improving the structure and organic matter of the soil.

Wetlands and soil

Wetland ecosystems play important roles in the freshwater cycle through the evapotranspiration of wetland plants, which returns up to 60% of all rainfall to the atmosphere. Also, because of their high productivity, wetland plants contribute a large part of soil organic matter, thereby increasing the porosity of soils and their capacity to retain water.

Extreme weather events such as floods and droughts are expected to occur with greater frequency and intensity due to climate change (Teixeira et al. 2014). Soils can help mitigate the impact of such events by capturing rainwater to its maximum storage capacity. In coastal areas, freshwater watertables help contain the salt wedge[1] and thereby prevent the salinization of wells and crops.

Wetland coastal gradients

Interactions between land and sea occur mainly along coastal beaches and dunes and through various types of flooded wetlands, forming a gradient. On the coastal plains, the freshwater that flows by surface runoff and groundwater from mountains to the coast gives life to wetlands. Further inland along the gradient are freshwater wetlands that remain flooded for long periods. Salinity increases closer to the sea due to the actions of tides and waves and the penetration of the salt wedge. The interaction of freshwater and seawater is highly dynamic, and flooding varies by day, month and season. Estuaries are always flooded and have high salinity (close to that of seawater). Mangroves receive some freshwater and consequently their salinity is lower; moreover, flooding is not permanent. Freshwater marshes (herbaceous wetlands) and swamps are flooded most of the year and are not influenced by the sea.

Figure 1 shows a model of various types of coastal ecosystem and their location along the salinity and inundation gradient. The coastal strip influences soil water storage capacity through the interception and containment of water flows, protecting the soil from erosion, increasing infiltration and decreasing maximum flows. Figure 2 shows the differences in salinity between mangroves and freshwater swamps and marshes.

[1] The salt wedge refers to a phenomenon in which denser seawater moves landward along the bottom of estuaries, forming a wedge-shaped layer—below a freshwater layer—that becomes thinner as it gets closer to land.

Figure 1: The coastal salinity and inundation gradient, and the ecosystems involved

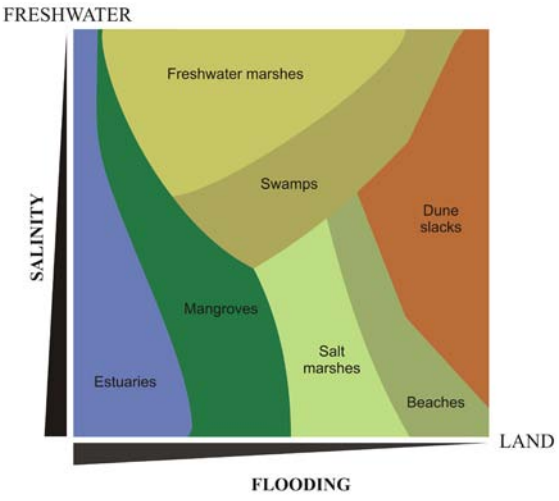
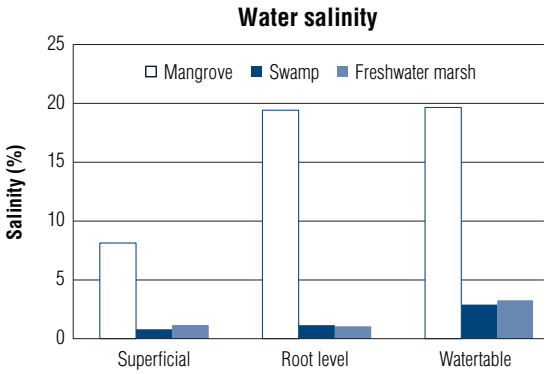


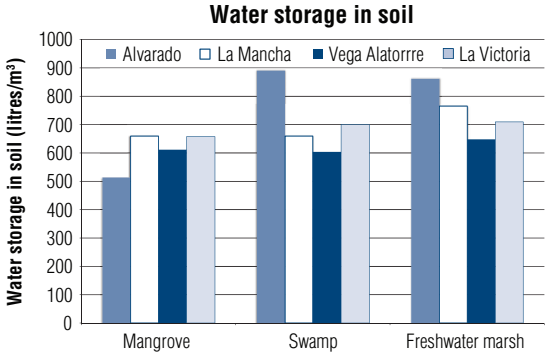
Figure 2: Water salinity in the watertable, in surface water and in water near plant roots in three types of wetland along a coastal gradient in Veracruz, Mexico



ITTO project RED-PD 045/11 Rev.2 (M) analyzed the potential contribution of soil to water storage at a depth of 1 m in several types of wetland. The contribution was found to vary depending on the soil properties at a given location and the type of wetland, with soil water storage capacity lower in mangroves than in swamps and freshwater flooded forests (Figure 3). Swamp soils—with their high organic matter—function as water reservoirs, retaining 7–8 times their weight in water.

Despite the importance of the coastal gradient in the tropics, attention is most often given to mangroves, and the important role of freshwater wetlands is largely forgotten. The study found that freshwater swamps and marshes that store more than 784 litres per m^3 can make significant contributions to mitigating the effects of flash floods, which are frequent on the coastal plains of Veracruz (Campos et al. 2011). Moreover, restoring degraded freshwater swamps and marshes could significantly reduce the volume of water discharged during the rainy season. Programmes to restore degraded freshwater swamps and marshes, as well as mangroves, have the potential to considerably improve soil water storage capacity on the coastal plains of Veracruz, thereby reducing flooding and increasing the reliability of freshwater supply (Campos et al. 2016).

Figure 3: Amount of water stored in the soil at a depth of 1 m in mangroves, freshwater swamps and freshwater marshes at four sites along a coastal gradient in Veracruz on the Gulf of Mexico



Brackish: A red mangrove forest (*Rhizophora mangle*), Veracruz, Mexico. *Photo: G. Sanchez-Vigil*

Fresh: A freshwater swamp (*Pachira aquatica*) (left) and a freshwater marsh (*Pontederia sagittata*) (right), Veracruz, Mexico. *Photo: G. Sanchez-Vigil*

Conclusion

Swamps and herbaceous wetlands are crucial for reducing flood peaks because they slow the flow of water (which thus causes less damage). By acting as a barrier to the infiltration of seawater, these ecosystems also help contain salt wedge intrusion and guarantee the freshwater supply (Campos et al. 2011). The integrity of soil properties in these wetlands is at risk owing to their transformation into livestock pastures (even though these are often flooded a few months of the year), and from real estate developments for which wetlands are drained and filled to make way for the construction of urban complexes. There is a high risk of losing the organic matter that has accumulated in organic soils when wetlands are drained, significantly affecting their water and carbon storage capacities. It is essential, therefore, to protect the soil's water storage capacity because of its many co-benefits, such as water-quality improvement, biodiversity support, decreased soil erosion, contribution to nutrient cycles, biomass production, and the regulation of extreme events, such as floods.

More information on the ITTO project can be found by inserting the project code RED-PD 045/11 Rev.2 (M) into the ITTO project search function at www.itto.int/project_search.

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The trees left behind

Remnant trees, forests and wildlife are all vital for maintaining connectivity in agricultural landscapes in tropical Mexico

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Seed-bearer: The green toucanet, *Aulacorhynchus prasinus*, a frugivore, helps spread seeds across landscapes. *Photo: G. Sánchez-Vigil*

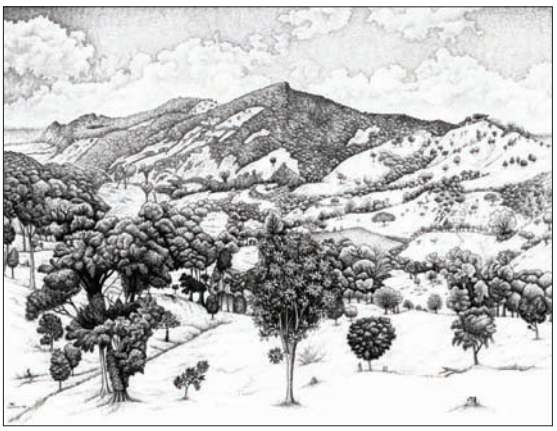
We tend to think of plants (and even some animals) as largely immobile or confined to one place. In reality, however, this is only how things appear, because all species are in continuous motion. This perpetual movement is essential for conserving and managing biodiversity.

The mobility of animals that consume fruits and seeds gives them—and the plant propagules they carry—access to diverse landscape spaces and resources. The juicy, nutritious structures and tissues of fruits and seeds feed many species of bird, mammal and insect. In turn, these animals, whether in flight or travelling by land or water, move plant propagules from one site to another in their ongoing search for places to feed, reproduce and grow. As long as plants and animals have this kind of mobility, landscapes will be integrated and resilient.

Conversely, however, the isolation of biodiversity limits the movement of plants and animals in a landscape and threatens their survival. It also puts in jeopardy the ecological processes that help maintain the structure and functioning of ecosystems and landscapes, such as soil fertility and water regulation, because of the role of biodiversity in such processes. One of the main reasons that such limitations might occur is habitat fragmentation, which is a direct and immediate consequence of landclearing. Biodiversity becomes isolated in habitat remnants, with many species unable to move between remnants across the large "empty" open spaces that now exist.

In ecological terms, the mobility of species is an indicator of landscape connectivity, which, in turn, is related to the quantity and quality of the exchanges that occur between habitat remnants and with the apparently empty spaces around them. Connectivity can be seen and measured as the flow of organisms, nutrients, matter and energy between components of a landscape. In a simple sense, it can be said that connectivity prevents the isolation of individuals, populations and elements in a landscape (Guevara et al. 2004).

Figure 1: Appearance of the predominant landscape in the rainforest of Los Tuxtlas, Veracruz, southeastern Mexico. Drawing: M. Escamilla



The coastal forests of the Gulf of Mexico

The landscapes of the Gulf of Mexico feature remnants of tropical dry forest and deciduous forest (*selva mediana caducifolia*) on sandy soils in the lowlands of La Mancha and Jamapa and evergreen rainforest in the Sierra de Los Tuxtlas mountains. All three are relicts of the original tropical forests, which once stretched along the full length of the gulf coast (Castillo-Campos 2006). These landscapes have noteworthy

Going it alone? This *Ficus cotinifolia* tree (middle background) is a remnant of forest that once covered the landscape but has now largely been cleared. Solitary trees in fields can still play important roles in landscape connectivity and the movement of species. *Photo: L. Cadavid*

biodiversity and a history of land use by various cultures that spans at least 5000 years. Recently, however, the region's forests have largely been transformed into pastures for livestock and fields for crops (such as sugarcane and fruit orchards) (Figure 1). Today, forest fragments sit in large expanses of herbaceous and shrubby vegetation.

Nevertheless, biodiversity is still high—for example, Los Tuxtlas alone boasts about 3300 species of plants. The question arises (Guevara 2010): How has biodiversity been maintained in these landscapes?

According to Sánchez-Azofeifa et al. (2005), birds and frugivores are responsible for the seed dispersal of 50–70% of forest species (trees, shrubs, epiphytes and herbaceous species) in the neotropics. Ortiz-Pulido *et al.* (1995, 2000) recorded 250 species of bird in coastal tropical dry forests in the Gulf of Mexico, of which 89 are considered frugivorous birds that are potential zoochorous seed dispersers. This makes them an influential guild in determining the composition and distribution of species in the coastal vegetation mosaic.

ITTO project RED-PD 045/11 Rev.2 (M) studied the role of standing trees and vegetation as landscape connectors in the coastal landscapes of the Gulf of Mexico, leading to the publication (in 2016) of *Técnicas, mañas y prácticas para recuperar y cuidar los árboles y el monte en los médanos de Veracruz* ["Techniques, tricks and practices to restore and maintain trees and woodland in the dunes of Veracruz"]. That publication sets out techniques for attracting birds, bats, insects and other wildlife that carry the seeds of trees and other plants to cleared dunes, thereby helping in the natural regeneration of those areas, providing connectivity between habitats, and restoring environmental functions. Techniques include providing perches for birds and bats; the use of nets for collecting wind-borne seeds; and methods for attracting native mammals to restored areas.

Elements such as forest fragments, trees lining the courses of rivers, hedgerows, and solitary trees all help in maintaining connectivity. The remainder of this article focuses on the solitary trees—some of great stature—left standing when forests are felled to create fields and pastures.

Remnant tropical forest trees

Solitary trees are attractive to the birds and bats that fly over pastures as sources of food, rest and refuge; they have a prominent role, therefore, in landscape connectivity (Hietz-Seifert et al. 1996).

In the Sierra de Los Tuxtlas mountains, 98 species of solitary trees have been recorded in pastures, at an average density of 2–6 trees per hectare (Guevara et al. 1998). The arrival of birds and bats has been recorded and seed fall has been estimated for some of these trees, as has seed accumulation in soils (seed banks) and seedling establishment under tree canopies.

The attractiveness of these trees to frugivores depends on the type and amount of fruit they produce throughout the year, as shown in higher visitation rates when the trees are laden with fruit. Even when trees have no fruit, however, fruit-eating birds will visit them to roost and rest (Laborde 1996)—conclusive evidence of the influence of solitary trees on connectivity and the regeneration of forest in abandoned areas (Guevara et al. 1986, 2005).

Fragmenting landscape: Once totally forested, this landscape is transforming into a patchwork of farmland and remnant forest, with many solitary trees in pastures. *Photo: G. Sánchez-Vigil*

Forest connectivity and regeneration in pastures

Observations of four solitary trees of the genus *Ficus* in pastures over more than 15 years revealed that they were visited by 47 species of fruit-eating birds (Guevara & Laborde 1993), nearly one-third of all frugivorous bird species reported in Los Tuxtlas (Laborde 1996). Mist nets captured 652 bats belonging to 20 species, 81% of which were frugivorous; this represents 56% of the bat species reported in the area (Galindo-González et al. 2000).

Seed rain

The ongoing visitation of solitary trees in pastures by birds and fruit bats results in the continuous deposition of seeds under the tree canopies (Guevara & Laborde 1993; Galindo-González et al. 2000). One study recorded a cumulative density of 992 seeds per m^2 over the course of a year (Guevara et al. 2004); the seeds belonged to 152 species, of which 26% were trees and 27% were herbaceous. Rainforest species accounted for 30% of total species richness.

Presence of seeds in the soil

More than 900 seeds per m^2 germinated in soil samples taken from under the canopies of solitary trees, of which the most abundant were colonizer species. Forest tree species in the area with large seeds do not accumulate in the soil because they germinate as soon as they fall to the floor (Guevara et al. 1986).

Plants growing under trees

One hundred and fifty species of plants were detected growing under the canopies of 50 solitary trees in the area (Guevara et al. 1992). The species composition of this cohort had greater floristic similarity to the composition of forest vegetation than to pasture vegetation. A significantly higher number of woody species dispersed by animals was found under the canopies of trees than in pastures; the density of individuals of tree species was also 4–5 times higher under canopies.

Connectivity and tropical forest conservation

There is strong evidence, therefore, of the positive influence of widely distributed, species-diverse solitary trees on landscape connectivity in the Gulf of Mexico region. These trees facilitate the movement of animals and plants across landscapes and form "regeneration nuclei", thus increasing the potential for forest regeneration on abandoned agricultural and livestock sites.

Amate (*Ficus spp.*), ojite (*Brosimum alicastrum*), abasbabi (*Poulsenia armata*) and palo mulato (*Bursera simaruba*), among others, are the best tree species in the area for attracting frugivorous animals. Armed with this knowledge, ranchers and farmers can manage trees (without changing their land use) to help species move between habitat remnants; decision-makers can factor in the use of solitary trees in planning forest conservation and future land uses. Overall, the knowledge will help improve the design and management of fragmented landscapes to best maintain biodiversity and forest ecosystem services.

Patchwork: The key elements of connectivity in this landscape in the Sierra de Los Tuxtlas mountains are small forest patches, live fences, riparian corridors and solitary trees. *Photo: Gerardo Sánchez-Vigil*

Publications produced by the project can be found by inserting the project code RED-PD 045/11 Rev.2 (M) into the ITTO project search function at www.itto.int/project_search.

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Benin's new system for improving forest data

An ITTO project helped establish Benin's National Forest Statistics Information Management System to improve forest-related decision-making

by Achille Orphée Lokossou[1], Théophile Kakpo[1], Clément Kouchade[2] and Romain Glele Kakaï[3]

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Learning: Students at the University of Djougou in Parakou, Benin, receive information and training on the new National Forest Statistics Information Management System. *Photo: ITTO/DGFRN*

The need for statistical information on the environment is increasing in parallel with the magnitude of environmental challenges. To address this need, the United Nations Statistical Commission developed and adopted the Global Strategy to Improve Agricultural and Rural Statistics for 2012–2017, with a view to addressing the decrease in volume and quality of statistics in developing countries. The significance of forest-related data is reflected in the Sustainable Development Goals in, for example, proposed indicator 15.1.1: "Proportion of land area covered by forest".

Forest statistics play a major role in informing sustainable forest management (SFM) at the national and local levels. Good-quality forest data are important for the development and implementation of sound policies and strategies and in determining development goals.

In Benin, a lack of reliable information hinders the implementation of SFM (INSAE 2014), with a participatory assessment showing a significant problem with the national statistical information management system. ITTO project PD 678/12 Rev.1 (M): "Establishment of a national forest statistics information management system in Benin" was implemented from July 2013 to November 2016 as part of the response to this problem.

Project implementation

The project was implemented in four stages:

1) mobilize and organize stakeholders;
2) determine and harmonize the procedures and methods for data collection and reporting among all directly relevant stakeholders, and the variables to be measured;
3) develop an online database; and
4) collect, process, validate and disseminate data.

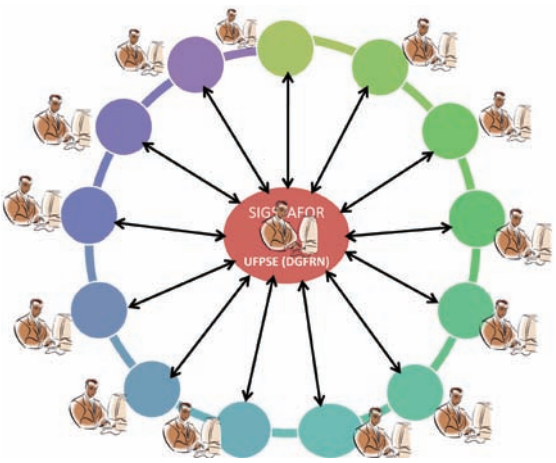
These stages are discussed in more detail below.

1. Mobilizing and organizing stakeholders

In stage 1, stakeholders—foresters, public administrators, the National Institute of Statistics and Economic Analysis (INSAE), timber producers, forest users, logging companies, timber traders, timber industrialists, technical and financial partners, non-governmental organizations and universities—were informed about the project, and the Standing Committee for Forest Statistics Coordination and Monitoring was established. One of the first steps was to identify the key agencies and institutions and their roles and responsibilities in the provision and management of forest-sector indicators. Fourteen of these bodies were identified, based on their specificities and areas of expertise in sector-related data: six forestry inspectorates distributed across Benin; the Harbour Forestry Brigade; INSAE; the Centre for Forestry Studies, Research and Training; the National Centre for the Management of Wildlife Reserves; the National Centre for Remote Sensing and Ecology Monitoring; the Directorate for Programming and Forecasting in the Ministry in Charge of Forests; the Programming, Monitoring and Evaluation Unit (UFPSE); and the National Timber Office.

The first stage was completed with the appointment and establishment of focal points in each of the 14 bodies, who were tasked with monitoring and compiling data pertaining to their respective agencies and with updating data related to indicators in the database. The UFPSE, in collaboration with the project coordinator, was responsible for coordinating the data-gathering mechanism, which is depicted in Figure 1.

Figure 1: A representation of the institutional arrangement for improving forest statistics in Benin



Note: Each bubble in the outer circle represents one of the 14 focal points, which all provide information to, and receive it from, the National Forest Statistics Information Management System, SIGSTAFOR.

2. Determining and harmonizing procedures and variables

In Stage 2, an assessment was conducted of all sector indicators to be measured and all information requested by stakeholders. The procedures and methods used for collecting data on indicators, as well as the reporting formats, were developed with the support of consultants and validated by stakeholders.

Forest statistics provide information on the state of forests and the major changes occurring in space and time. In Benin's forest sector, 43 statistical variables were identified as crucial, based on five criteria. The variables should:

1) enable the reliable measurement of the outcomes of efforts conducted in realizing Benin's forest-sector-related sustainability goals;
2) be clear and easy to understand and provide transparency in the management of forest resources;
3) be compatible with the indicators and data requested by technical and financial partners and with other indicators used at the global level, thereby providing a basis for comparison at the national, regional and international levels;
4) be based, as far as possible, on international standards, guidelines and best practices; and
5) be determined on the basis of acknowledged data sources and also be quantifiable and consistent to enable measurement over the long term.

Table 1 sets out the 43 statistical variables and related information on forest resources.

For each indicator, stakeholders developed and validated the method and form to be used for data collection (Glélé Kakaï 2014). Not all data have been fully collected, and efforts are underway to do so.

3. Participatory development of online database

Stage 3 focused on centralizing the data collected across the 14 institutions in a single database—the National Forest Statistics Information Management System (SIGSTATFOR)—developed on a participatory basis with the assistance of a consultant and the collaboration of focal points. The focal points, assisted by an administrator, now maintain SIGSTATFOR[1], which is fully accessible to all stakeholders. The fact that it can be updated using a tablet shows the innovative nature of the project. To facilitate the collection and management of forest statistics, the project provided each focal point with appropriate computer equipment and internet connection kits. All focal points as well as relevant staff in participating institutions received training in operating the database. A user manual[2] and a management guide were also developed.

To facilitate the wide dissemination of baseline information on the forest sector, a website[3] was developed for the General Directorate of Forests and Natural Resources (DGFRN). Documents pertaining to Benin's forests and wildlife have been posted on the website for dissemination.

4. Collection, processing, validation and dissemination of forest-sector-related statistical data

With project support, forest statistics directories for 2013–2014 (DGFRN 2015) and 2014–2015 (DGFRN 2016) were produced, published (500 copies) and distributed to all stakeholders. The directories are also available on the DGFRN website.

Project impacts

The project had the following impacts:

- Significant participation of stakeholders was obtained in the collection and management of forest data.
- Forest statistics management was institutionalized in compliance with the guidelines of the United Nations Statistics Division (UNSD 2016). This was made possible by the establishment of the Standing Committee for Forest Statistics Coordination and Monitoring based on an interministerial order.
- National forest statistics are now available online.
- The DGFRN website now provides the public—such as economic operators, users, students, researchers, non-governmental organizations and technical and financial partners—with downloadable background information on the forest sector.
- Forest statistics directories for 2013–2014 and 2014–2015 were developed and disseminated.
- National data and indicators on forest resources can now be updated in a timely fashion.

1 dgfrn-bj.org/foretstatbenin/index.php.
2 dgfrn-bj.org/foretstatbenin/aide/foretstatbenin.pdf.
3 http://dgfrn-bj.org.

Table 1: Statistical variables and related information on forest resources in Benin

No.	Variable	Measurement unit	Comments/indicators
1	Land area covered by vegetation and types of land uses	Hectares	Proportion of forest area
2	Function, situation and description of gazetted forests*	Hectares, type of function	Proportion of degraded areas in gazetted forests
3	Function, situation and description of national parks and hunting areas	Hectares	Proportion of protected areas dedicated to biodiversity conservation
4	Function, situation and description of sacred forests with simple management plans	Hectares, type of function	Proportion of protected areas dedicated to biodiversity conservation
5	Function, situation and description of reforested areas/ state plantations	Hectares, type of function	Proportion of areas reforested by government
6	Function, situation and description of private forests	Hectares	Proportion of private forest areas
7	Function, status and description of private plantations*	Hectares, type of function	Proportion of areas reforested by private sector
8	Evaluation of timber potential*	Cubic metres	Change in standing timber volume
9	Evaluation of construction timber*	Cubic metres	Change in standing timber volume
10	Evaluation of wood-energy potential*	Steres, cubic metres, metric tonnes	Change in standing timber volume
11	Situation of nurseries and seedling production	Number of nurseries, seedlings produced	Production unit and production per species
12	Area of new forest plantations	Hectares	Reforestation
13	Forest enrichment	Seedlings per hectare	Species per management unit
14	Production of timber	Cubic metres	Volume per product type, indicator of sustainability
15	Production of construction timber	Cubic metres	Indicator of sustainability
16	Production of energy wood (fuelwood and charcoal)	Steres, cubic metres, metric tonnes	Production of fuelwood and charcoal
17	Transactions on timber rural markets	XOF** (national currency)	Indicator of operation
18	Wood processing in industries*	Cubic metres	Timber species and product type
19	Export of timber forest products	Cubic metres	Timber species and product type
20	Import of timber forest products*	Cubic metres	Timber species and product type
21	Violations related to timber forest products	Number of violations	Illegal harvesting indicator
22	Harvesting of non-timber forest products from plants*	Kilograms, cubic metres	Product type
23	Number of staff in CITES-listed species production units‡	Number	Per species and production unit
24	Count of fauna in national parks and hunting areas	Number	Indicator of management
25	Hunting management in hunting areas	Number	Species per hunting area
26	Count of fauna in forests and plantations*	Number	Species
27	Hunting management in forests and plantations*	Number	Species
28	CITES-listed species	Number	Species and export country
29	Export of non-endangered fauna species	Number	Species and export country
30	Trade of CITES-listed species	Number, country	Flow of CITES species
31	Violations related to CITES-listed species	Number	Illegal harvesting indicator
32	Forest administration staff	Number, gender	Number of staff in charge of forest management
33	Training in forestry*	Number of training institutions, number of trained persons	Number per type of training
34	Forest administration	Number, gender, training of management-level staff	Human resources
35	Forest management-related controlled fires in national parks, forests and plantations	Hectares	Burned areas involving early fires
36	Late fires in forests, national parks and plantations	Hectares	Burned areas involving late fires
37	Damage caused by arson	XOF	Estimate per type of damage
38	Evaluation of disturbances in forests and plantations	Hectares	Type of damage
39	National budget allocated to forest administration	XOF	Indicator of financing from national budget
40	External financing of forest administration	XOF	Indicator of mobilization of external financing
41	Wood users	Number	Number per activity category, gender
42	Revenue-generating alternative activities	Number, budget	Type of activity, groups
43	Annual contribution of forest sector to national budget*	Percentage	Indicator of significance

* Data not yet fully collected. ** XOF = West and Central African franc(s). ‡ CITES = Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Stock items: Workers tend seedlings in a tree nursery in Banamè, Benin. Nursery production is one of the variables measured in the National Forest Statistics Information Management System. *Photo: PAGEFCOM*

Project implementation had an impact on the structure of the forest administration. The Planning, Monitoring and Evaluation Division was established at the departmental level (forest inspectorates), and UFPSE was created, with the status of a directorate. SIGSTATFOR served as a model at the level of the supervising ministry for establishing a similar system in the environment sector.

Lessons learned

The major lessons learned in the project include the following:

- Appointing statistics focal points in the various institutions in the forest sector proved to be an efficient approach for ensuring the collection of data and the sustainability of actions.
- The appropriate definition of indicators facilitated data collection.
- The dissemination of reliable information on the forest sector strengthens the involvement of stakeholders and helps generate interest in government and among decision-makers in favour of the sustainable management of forest resources.
- SIGSTATFOR can be reproduced and extended to other sectors (such as environment, water and fisheries).

Conclusion

The project contributed to building the capacity of the forest administration in data collection and statistics management and to improving the visibility of forest resource management. It is now possible to complete the Joint Forest Sector Questionnaire (an initiative of ITTO and other organizations) in a timely fashion, and stakeholders have greater access to reliable information through the online database. Although SIGSTATFOR was operational at project completion, however, capacity-building measures are still needed to address skills gaps as well as concerns raised by grassroots stakeholders with a view to ensuring the system's stability and sustainability.

Further information on the project can be found by inserting the project code PD 678/12 Rev.1 (M) into the ITTO project search function at www.itto.int/project_search or at dgfrn-bj.org/foretstatbenin.

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Livelihoods and the law

An ITTO project provided local people with training to boost their incomes as a way of strengthening forest governance in Cambodia

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Cash-in-hand: A local woman sells a bamboo basket manufactured after training provided under ITTO project PD 673/12 Rev. 1(F), Kratie Province, Cambodia. *Photo: K. Ra*

The aim of ITTO project PD 673/12 Rev. 1(F), which was implemented by the Forestry Administration of Cambodia from May 2013 to July 2016, was to strengthen the Forestry Administration's capacity in forest law enforcement and the governance of the permanent forest estate in Cambodia's Kratie and Mondulkiri provinces. The forest area in the permanent forest estate in the two provinces was estimated at 2.1 million hectares in 2010, which was 20% of the national total. The sustainability of these forests is under threat, however, due to rampant illegality, inadequate law enforcement, and weak support for sustainable forest management (SFM) among local stakeholders.

The specific objective of the project was to be achieved through the delivery of three outputs: 1) enhanced operational capacity of the Forestry Administration in enforcing forest laws in the permanent forest estate in Kratie and Mondulkiri provinces; 2) improved awareness of, and incentives for local communities to support initiatives to strengthen forest law enforcement and governance; and 3) increased collaboration between the Forestry Administration and stakeholders.

This article addresses the livelihood element of the second of these outputs, which was to be delivered through eight activities, the following three of which were devoted to livelihood development:

1) establish four high-yielding agroforestry demonstration plots totalling 20 hectares, and four small nurseries, at four sites;
2) train 90 community leaders in four districts in techniques for high-yielding agroforestry and the development of small nurseries; and
3) establish four community-based small enterprises (CSEs) to demonstrate forest-based business development, and train 60 community leaders and members in this aspect.

The rationale

The rationale for activities aimed at improving livelihoods in the local communities was simple but crucial: they would serve as a strong incentive for local communities to support SFM and therefore forest law enforcement efforts and to reduce illegal forest activities.

In the pre-project situation, around 30% of households in Kratie and Mondulkiri provinces earned less than US$1 per day. With such a high level of poverty, it would be unreasonable to expect local people to support SFM—because forests were providing only meagre economic benefits and therefore were perceived as not worth maintaining.

Although the project's specific objective was to strengthen the law enforcement capacity of the Forestry Administration, this alone would be insufficient, and the support of local stakeholders was also vital. To obtain such support, local communities require incentives, and consultations revealed that supporting sustainable livelihoods would be most effective.

Tall order: A local man, Sok Min, and project consultant, Hem Chanrithy, inspect seedlings (*Dipterocarpus alatus, Afzelia xylocarpa, Dalbergia bariensis, Dalbergia cochinchinensis* and *Hopea odorata*) produced in a local nursery after training under ITTO project PD 673/12 Rev. 1(F), Kratie Province, Cambodia. *Photo: H. Chanrithy*

Implementation strategy

The project's livelihood development activities were implemented collaboratively. Local community leaders and members were trained with the assistance of an experienced local non-governmental organization, the Cambodian Rural Development Team, and a professional national consultant, Mr Hem Chanrithy. Training in forest-based business for bamboo product development was implemented in collaboration with Mr Koy Ra, a forest professional. Independent consultants were used because the Forestry Administration lacked the necessary expertise and time to adequately execute the activities on-site.

Results

Agroforestry system and nursery development

Training needs were assessed in meetings in various villages involving, in total, 141 villagers (of whom 45 were women)—four village chiefs, eight commune councillors and 129 community members. Among other things, the assessment determined that there was a need for training in agroforestry techniques, the growing of high-yielding fruit trees and crops, and seedling production.

Training targets were set in meetings with 174 participants, including 62 women, comprising 15 Forestry Administration staff, eight village chiefs, eight commune councillors and 143 villagers.

About 28 hectares of agroforestry demonstration plots were established at four sites in the two provinces involving 101 beneficiaries, of whom 56 were women. The tree species planted in the agroforestry plots were *Afzelia xylocarpa* (Cambodian name "beng"), *Dipterocarpus alatus* ("chheur teal"), *Dalbergia bariensis* ("neang nuon"), *Dalbergia cochinchinensis* ("kra nhoung") and *Hopea odorata* ("koki"). The fruit species planted were jackfruit, avocado, annona, orange, lemon and mango, and the crop species were cucumber, long bean, long eggplant and cabbage. Four small-scale nurseries were established at four sites involving the same beneficiaries as for the agroforestry demonstration plots; these nurseries produced the tree, fruit and crop seedlings planted in the demonstration plots in collaboration with participants in the training programme—the nurseries were established as part of the process of technology transfer. The nurseries have the capacity to produce around 20 000 seedlings per year for distribution to local communities.

Twenty-four field training courses involving 635 participants (including 335 women, which was 53% of the total) were convened consisting of:

- four courses on livelihoods, forest conservation, and agroforestry, with 109 trainees (59 women);
- four courses on nurseries for fruit and tree species, composting and water management, with 101 trainees (50 women);
- four courses on cash crops, with 101 trainees (56 women);
- four courses on home gardening, with 98 trainees (47 women); and
- eight courses on livestock, with 226 trainees (123 women);

In addition, 40 commune council members and village leaders took part in training on agroforestry and nursery techniques.

Before completing the training programme, 101 households were given a total of 4840 seedlings of various fruit species, such as rambutan, mango, pineapple, guava and plum. After completing their training, trainees established four medium-sized nurseries and five small-sized high-yielding agroforestry plots.

In addition to the formal training courses, the Cambodian Rural Development Team convened 174 follow-up coaching sessions for community members and leaders on agroforestry and agricultural techniques.

The establishment of the agroforestry demonstration plots and nurseries was not intended to create employment directly; rather, the main purpose was to provide training and to transfer technologies to local people. Now, people in the local communities should be able to boost their incomes using the skills they have learned.

Forest-based business development

Dialogues were held in communities to assess training needs. In light of this assessment and the availability of raw materials, various bamboo products were selected for development. Training was provided in bamboo product production techniques for 60 community leaders and members at four sites in the two provinces. Four CSEs were established at the same sites as business vehicles, and community leaders and members received training in CSE management.

By the end of the training programme, trainees in Kratie Province were capable of fully producing a range of five bamboo products, and trainees in Mondulkiri Province were producing four bamboo products. Some of the bamboo production was for consumption by the households themselves, and some is being sold in local markets. No products had been sold in the national capital by the close of the project, but the CSEs are aspiring to do so—a goal that would benefit from assistance from relevant government institutions.

The project made available a small amount of revolving funds as a way of encouraging CSEs to take up the bamboo business. To be eligible to receive such funds, CSEs had to submit a business plan, prepared with the assistance of Forestry Administration staff, showing how the funds would be used and paid back (using revenues derived from the sale of bamboo products). An amount of US$200 was provided to each of four CSEs; the revolving funds were still in operation at project completion.

Valuable bamboo: Members of a community apply a technique as part of training in the production of high-quality bamboo products under ITTO project PD 673/12 Rev. 1(F), Kratie Province, Cambodia. *Photo: K. Ra*

Analysis of training outcomes

Training implementation approach

The training was implemented in a fully collaborative manner by consultants and participants. Knowing that target communities have different experiences and needs and that the sites also vary in character, the first step was to assess the needs of target communities. This was done through intensive discussions at the village level, led by the consultants.

The assessment covered aspects such as site identification, crops and products to be developed, and input requirements (e.g. equipment, facilities and fertilizers). The assessment also helped ensure an effective practical training process.

A learning-by-doing approach was adopted in conducting the field training. Trainees carried out all aspects of the work, including soil preparation, the planting of seedlings and crops, the nurturing of young plants, and fertilization, under the guidance and supervision of the consultants. As farmers, the trainees were already familiar with most of these aspects, and the primary task of the consultants was to polish the farmers' techniques to increase efficiency and productivity. Training in the manufacture of bamboo products focused on improving efficiency and quality because most of the trainees already had a certain level of experience in the process.

There was strong interest in the training programme in the local communities, which can be attributed to the approach and strategy pursued. The trainees were taught what they needed and wanted to do. The villagers were convinced that the techniques taught by the project were practical and would help them increase their incomes over the long term.

By design: Community members, consultants and Forestry Administration staff discuss the design of an agroforestry system as part of the participatory approach adopted by ITTO project PD 673/12 Rev. 1(F), Kratie Province, Cambodia. *Photo: Cambodian Rural Development Team*

Significance of the training

The training programme could have far-reaching implications for the livelihoods of local communities. Villagers trained in agroforestry and nursery development now understand the potential of modern agroforestry; they can design agroforestry systems taking site conditions into account; and they have the skills to prepare lands for agroforestry, plant trees, grow cash crops, control pests and diseases, improve fertility using green fertilizers and create live fences. The trained villagers can establish nurseries, with skills in soil preparation, seed germination and the transplanting and nursing of seedlings. Participants in the training on bamboo production can now produce a range of bamboo products, from which villagers expect to generate ongoing income streams.

Potential constraints to community forestry enterprise development

The availability of land, labour and capital are potential constraints on putting the acquired skills into effect at the project sites. Each of these is discussed below.

Land

Community forest development is a priority programme in the Cambodia National Forest Plan 2010–2019, the main objective of which is to improve the livelihoods of forest communities in a sustainable manner by wisely using forest resources. As of 2015, the government had approved at least 50 community forest management units (CFMUs) for livelihood development under certain conditions and requirements. Unproductive forestlands in these CFMUs are available for agroforestry and farming activities.

Labour

The success of agroforestry, nursery development and forest-based business activities requires skilful farmers. Although the training conducted under the project helped equip several hundred farmers with the necessary skills, this was only a small proportion of the total number of farmers in Kratie and Mondulkiri provinces who need up-skilling. There is a need, therefore, to do similar training for other communities in the two provinces, as well as in other provinces in the country. This, however, may require additional external financial resources.

Capital

Agroforestry, nursery production and bamboo business development require inputs that must be purchased, and a certain additional amount of working capital is also needed. The unavailability of capital is probably the most limiting factor to livelihood development in the project area. To overcome this, the government may need to consider a soft-loan scheme under certain agreed-on conditions. Another option is to involve the private sector, for which the government may need to provide an incentive to make such involvement attractive to investors.

Concluding remarks

The training programme for livelihood development conducted as part of ITTO project PD 673/12 Rev.1 (F) was implemented successfully and produced significant results, although the increase in local household income and employment attributable to the programme has not been quantified. The training programme was not designed to directly create job opportunities; rather, its purpose was to equip trainees with the skills to create job themselves or to work elsewhere in order to generate income, reduce dependence on forest resources and thus contribute to SFM in Kratie and Mondulkiri provinces. Such skills could be invaluable socioeconomic assets for improving local livelihoods as land becomes available under the government-led community forestry programme. Women could play an important role in generating income for their families and in managing forests sustainably for their communities.

Although there is a need to continuously improve forest governance to ensure the effective involvement of local communities, the major limiting factor in making use of the newly acquired skills is the availability of financing capital. This constraint must be removed or minimized through, for example, a bank soft-loan scheme, an incentive scheme to encourage the involvement of the private sector, or both. Moreover, the training effort needs to be expanded nationwide, for which internal and external sources of financing must be sought.

Publications produced by the project can be found by inserting the project code (PD 673/12 Rev.1 (F)) into the ITTO project search function at www.itto.int/project_search.

More information on the project is available at the project website (http://twgfr.org/ittopd673) and on its Facebook page.

Fellowship report

A study undertaken with the assistance of an ITTO Fellowship has provided insights into the benefits of shihuahuaco seed collection in Ucayali, Peru

by Daniela K. Requena Suarez

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Q&A: Daniela Requena Suarez interviews forest manager R. Velazco Aguilar as part of her analysis of the links between a large-scale plantation, a vulnerable tree species, and the livelihoods of local people in Ucayali, Peru. *Photo: D. Requena Suarez*

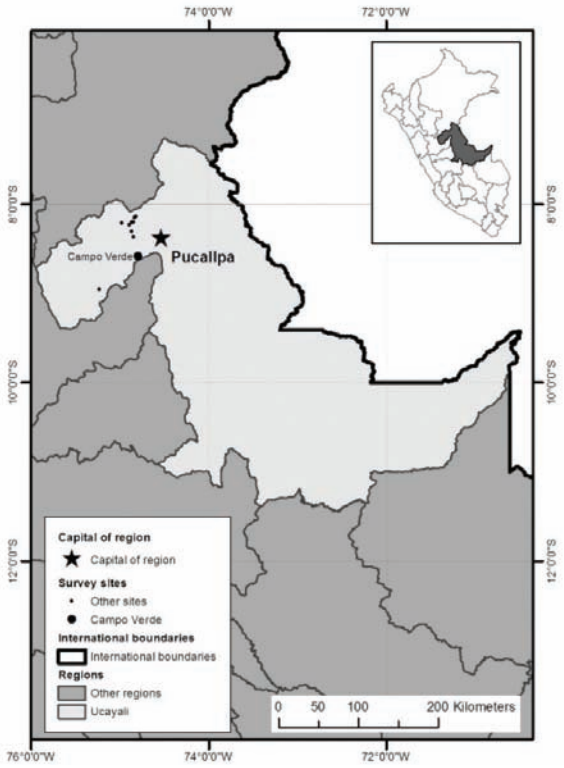
In the Peruvian Amazon, tree species in the genus *Dipteryx*—commonly referred to as "shihuahuaco"—have seen heavy population declines in the last three decades due to increasing national and international demand for their timber (Putzel 2010). As scarcity has increased, several shihuahuaco plantations have been established in the Amazon, including the Campo Verde plantation in the Ucayali Region, Peru.

Local communities eat shihuahuaco seeds, which contain trace elements such as zinc, iron and copper that are beneficial to human health (Limache 2015). This non-timber use of *Dipteryx* species, which is less well known than their timber, and the use of seeds as reproductive material for increasingly valuable shihuahuaco, have generally been omitted from management considerations in Peru.

The implications for forest conservation outcomes and the livelihoods of shihuahuaco seed collection for personal consumption and the establishment of plantations are unclear. For this reason, I conducted a study on this topic in June and July 2016 with the help of an ITTO Fellowship and additional funding from Fauna & Flora International under the auspices of its Global Trees Campaign and Conservation Leadership Programme.

I chose the Campo Verde plantation as a case study because of the magnitude of its shihuahuaco seed collection efforts and the involvement of local communities in those efforts. The purpose of the study was to contribute to the plantation-versus-conservation debate in an unconventional way—by analyzing the links between a large-scale plantation, a vulnerable group of species, and the livelihoods of local people. The study had two specific aims: 1) to understand how a large-scale plantation interacts with shihuahuaco seed collectors; and 2) to analyze the perceptions of seed collectors toward shihuahuaco conservation and the impacts that seed collection might have on conservation and livelihoods.

Figure 1: Location of the study site



Seed source: Interview participant R. Velazco Aguilar inspects a shihuahuaco seed tree at CICFOR-Macuya, Huanuco Region, Peru. *Photo: D. Requena Suarez*

Methodology

An inductive research approach (Bloomberg & Volpe 2016) was employed, in which shihuahuaco seed collection at Campo Verde was analyzed using key informant interviews, seed collector surveys, and a proximity analysis of selected locations of shihuahuaco seed trees in the Ucayali Region of Peru. Key informant interviews were carried out in Pucallpa (the capital of the Ucayali Region) and its peri-urban areas. Participants were selected according to their level of experience in the forest sector in the Peruvian Amazon and their knowledge of shihuahuaco extraction, propagation and ecology.

Qualitative surveys of shihuahuaco seed collectors were carried out in the provinces of Coronel Portillo and Padre Abad in the Ucayali Region. To be selected, respondents must have lived in the Peruvian Amazon for at least five years and collected shihuahuaco seeds at least once for either personal or commercial purposes. Sequential sampling was carried out using a snowball sampling technique, in which the initial respondents—identified via the key informant interviews—provided the names of additional respondents or the locations in which they lived.

A proximity analysis was carried out by examining the locations of shihuahuaco seed trees known to the Campo Verde plantation. Using a geographic information system, these were overlaid with Ucayali's road and river systems (as provided by the Regional Government of Ucayali) to identify the distance of each shihuahuaco tree to its nearest access point. Each distance was grouped into one of ten distance categories in the range of 0–5 km.

Findings

Key informant interviews

I interviewed 17 experts on shihuahuaco and forests as key informants. A major finding was that, even though shihuahuaco produces high-quality timber and grows much faster in plantations than in natural forests, its relative slow growth compared with other native species such as marupá (*Simarouba amara*) and capirona (*Calycophyllum spruceanum*) means it is unlikely to be used in future plantations. The Peruvian government's newly established plantation policy (MINAGRI 2011) and credit scheme (Gestión TV 2015) favour faster-growing species, resulting in a decline in interest in shihuahuaco plantations.

Shihuahuaco non-wood products are not used commercially in Peru. Nevertheless, although the shihuahuaco trees in Campo Verde are too young to bear fruit, private companies are expressing interest in harvesting shihuahuaco seeds. It is possible that demand for this product will change the way in which private companies regard shihuahuaco plantations, but this will only become evident when shihuahuaco plantations start producing seeds.

Local communities played a vital role in the identification of potential shihuahuaco seed trees. The establishment of informal agreements in which Campo Verde entrusted collectors with the provision of shihuahuaco seeds generated a positive link between the company and several small communities. Campo Verde benefited in indirect ways, such as by adopting local seed treatment practices, which led to high germination and establishment rates. Campo Verde's activities generated economic benefits for local communities during the seed collection period. This shows that smallholders can benefit from large-scale plantations; however, the flow of benefits depends on the needs and goals of the plantations.

Seed collector surveys

One hundred and eleven seed collectors were surveyed in nine non-indigenous communities and two indigenous communities in the provinces of Coronel Portillo and Padre Abad. The sample consisted of 85 men and 26 women in the age range of 17–74 years (Table 1 presents general information on the sample population). The findings suggest there are two types of shihuahuaco seed collector: the pragmatic collector, and the opportunistic collector.

Pragmatic collectors (n = 61) collect shihuahuaco seeds because they value the direct benefit of selling the seeds to plantation buyers, in this case Campo Verde. Seed collection is usually done in small groups of friends or as a family activity. Seeds are collected under shihuahuaco trees over a period of 1–2 days using large sacks. Most of the collected seeds are sold to buyers; collectors might retain small quantities, of which they may eat some, plant some in their fields, and give others away.

Opportunistic collectors (n = 50) collect shihuahuaco seeds because they find them during their daily routines. They will usually enter the forest to hunt, fish, harvest wood or access their land. During such activities, opportunistic collectors may find seeds either under shihuahuaco trees or piled along small creeks; the latter have been collected by bats (Romo et al. 2004), which "make the seeds travel". When opportunistic collectors find seeds, they will either pick them up and carry on with their daily activities or, if the quantity of seeds is high, they will bring their families the following day to collect them. Most of the collected seeds will be roasted and eaten, and a few will be set aside for planting or given away. If approached by buyers, opportunistic collectors might accept an offer and adopt the motives and practices of pragmatic collectors, but only during that collection period.

Table 1: Demographic overview of surveyed shihuahuaco seed collectors (n = 111)

General information					
	No.	**%**		**No.**	**%**
Gender			**Occupation**		
Male	85	77	Farmer	82	74
Female	26	23	Housewife	17	16
Age			Logger	6	5
16–25	9	8	Other	6	5
26–35	24	22			
36–45	29	26	**Education**		
46–55	23	21	Primary	74	67
56–65	17	15	Secondary	31	28
66–75	9	8	Higher	6	5
Current place of residence and origin			**Place of birth**		
Non-indigenous community	85	77	Ucayali	71	64
Indigenous community	26	23	Peruvian Amazon	31	28
Years spent in the community			Peruvian Coast	2	2
1–10	78	70	Peruvian Sierra	7	6
11–20	23	21			
21–30	3	3			
31+	7	6			

Both opportunistic and pragmatic collectors have been engaging in conservation through small-scale forestry. Of the 43 collectors who claimed to own planted shihuahuaco trees, 40 said they had planted the trees themselves. When asked about the future of those trees, 37% said they would leave them for their children and grandchildren, 30% stated they would leave the trees "for the environment", 16% said they would harvest them for timber, and the remaining 17% provided no clear answer. These answers did not differ according to collector type.

More than 65% of both pragmatic and opportunistic collectors believed that seed collection was good conservation practice if the seeds were planted somewhere else. Those who argued against seed collection said that it hindered natural regeneration and the provision of food for wildlife.

When asked what they had done with the money earned from seed collection, 28% of pragmatic collectors reported they had spent it buying food and 7% said it had been used for house expenditure. Additional individual answers included daily expenditures, investment in properties, investment in livestock, school supplies, and health-related expenditure. Fifty-two percent of pragmatic collectors gave no answer to this question.

Proximity analysis

The proximity analysis of 119 locations of shihuahuaco seed trees georeferenced by Campo Verde showed a mean distance of 1.3 (±1.05) km to the nearest access point. Eighty-seven locations (73% of the locations analyzed) were within 1.5 km of the nearest access road or waterway (Figure 2). The nearest location was 4.3 m from an access road, and the farthest location was 4.6 km from the nearest waterway.

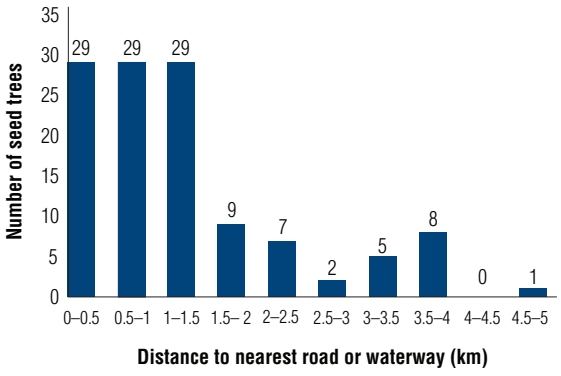
This analysis shows the vulnerability of shihuahuaco to extractive logging and deforestation; both these threats are closely associated with roads and road expansion (Barber et al. 2014; Laurance et al. 2009). Barber et al. (2014) estimated that about 95% of deforestation in the Amazon happened within 5.5 km of a road or within 1 km of a navigable waterway.

Discussion

This case study showed that Campo Verde benefited shihuahuaco conservation and surrounding livelihoods during the seed collection phase. However, the rise of plantations of faster-growing species has resulted in a loss of interest in plantations of slower growth, such as shihuahuaco. The case study suggests, therefore, that the potential conservation benefits of plantations for vulnerable species may ultimately be restricted by social, political and economic factors.

The two types of collector identified in this study vary in their motives and frequency of seed collection and in the final endpoints of the seeds they collect, but an analysis of perceptions of shihuahuaco conservation showed similar attitudes among both pragmatic and opportunistic collectors. Most collectors believed that shihuahuaco populations had diminished and attributed this to indiscriminate logging. More than 88% of both collector types claimed to have

Figure 2: Proximity of selected shihuahuaco seed trees to access roads and waterways in Ucayali, Peru



previously owned shihuahuaco seed trees that had been harvested, either by themselves or by others.

The traditional practice of collecting the seeds gathered by bats has tied the two previously unlinked concepts of traditional shihuahuaco seed collection (Limache 2015) and bat-assisted shihuahuaco seed dispersal (Romo et al. 2004). This shows that opportunistic seed collectors are engaged actively in both shihuahuaco seed collection and natural forest ecological processes.

Most pragmatic and opportunistic collectors reported engaging with shihuahuaco saplings found on their lands through activities such as weeding around saplings and transplanting them to clearings. These findings align with those of Putzel et al. (2012), who also reported smallholder engagement in shihuahuaco regeneration, which seems to be equally present regardless of the motives of shihuahuaco collection. It is possible, therefore, that pragmatic collectors who engage with shihuahuaco seeds for purely monetary reasons are now adopting small-scale forestry practices that benefit the conservation of shihuahuaco trees.

Most collectors were unable or unwilling to indicate how they had used the money they had earned in selling shihuahuaco seeds to Campo Verde, leading to questions about the monetary benefit of the activity. Positive answers such as contributions to food and household expenditure cannot be fully discarded, however.

Finally, the proximity analysis shows the vulnerability of shihuahuaco trees. It is highly likely that some of the shihuahuaco seed trees in the survey areas have already been felled, although this would require ground verification.

Conclusion

The benefits of the Campo Verde plantation for shihuahuaco conservation are indirect and subject to external factors. The potential future benefits for shihuahuaco conservation of large-scale plantations in Ucayali depend on political, social and economic factors. In addition, the analyzed shihuahuaco trees are vulnerable to deforestation and selective logging due to their proximity to access roads and waterways.

Both pragmatic and opportunistic seed collectors identified in this study vary in their motives but coincide in their perceptions of shihuahuaco conservation. Both collector types show a predisposition for collecting shihuahuaco seeds to plant them elsewhere and are aware that they will most likely not enjoy the direct benefits of planting these seeds. Both collector types believe that shihuahuaco seeds should be collected to aid shihuahuaco conservation and contribute to their own livelihoods.

It appears that demand for shihuahuaco seeds has created a new type of seed collector and increased the interaction between shihuahuaco trees and local communities. Ultimately, however, the weight of external factors inherent in the management of large-scale plantations is likely to decide the fate of this hardwood group of species in plantations in Ucayali.

Seedpod: A dried shihuahuaco fruit, with a survey participant and a child in the background. Each shihuahuaco fruit bears a single seed. *Photo: D. Requena Suarez*

The Peruvian government is evaluating the inclusion of shihuahuaco in the national list of threatened floral species (Vélez Zuazo 2016), which would be a starting point for addressing the indiscriminate logging of this species group for timber. My study identified two measures that could complement this inclusion: slower-growing species such as shihuahuaco should be incorporated in plantation policies and credit schemes; and community engagement can contribute to shihuahuaco conservation by encouraging sustainable seed collection, the protection of shihuahuaco seed trees, and the tending of saplings on their land.

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Market trends

As Japan's tropical timber imports stumble, the battle for its market intensifies

by Mike Adams

Compiled from reports of ITTO's Market Information Service

Two of the most important events in 2016 for the Japanese timber and building sectors were the postponement of the planned increase in consumption tax from 8% to 10%, and the adoption of a negative interest rate by the Bank of Japan. Both affected timber consumption because of their impacts on the housing market. Total housing starts expanded by 6.4% in 2016, compared with 1.9% in 2015.

Before the postponement of the tax rise, Japanese housing companies were expecting a surge in demand, as happened when the tax was raised from 3% to 5%. Consequently, building material manufacturers ramped up imports and production, only to find they were overstocked when the anticipated demand did not materialize.

As the saying goes, however, we should expect the unexpected. Although the tax hike did not deliver increased home sales, the abrupt change in interest rates did.

The mortgage loan interest rate crashed suddenly in 2016, and there was a subsequent rush to borrow to invest in housing. Moreover, a change in the inheritance tax drove those with money to plough funds into housing for rent.

The combined effect of low interest rates and the change in the inheritance tax has, however, distorted the housing market in Japan because of a surge in the building of apartments (Figure 1). Financial agencies in Japan are keeping a close eye on the condominium and apartment block loan portfolios of commercial banks to ensure that the banks are properly assessing the risks associated with such loans. There is growing concern that demand for housing could fall well below rapidly rising supply, even in the main cities, because the country's population is on a steady downward trend.

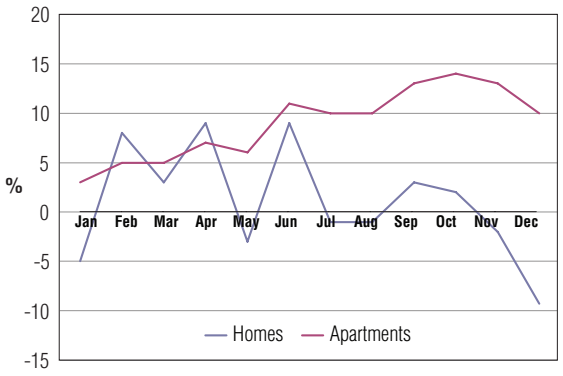
Import trends: down, down and away

The pace of decline in imports of tropical logs, sawnwood and plywood picked up in 2016, with year-on- year imports of tropical logs plummeting by 23%, tropical sawnwood imports down by 5% and plywood imports tumbling by 12%.

The overall downward trend in tropical timber imports is the result of several factors, including diminishing availability (particularly because Sarawak has reduced its log harvests), demand weakness due to a continuing decline in construction activity exacerbated by an aging and decreasing population, and government subsidies to encourage greater use of domestic timber resources.

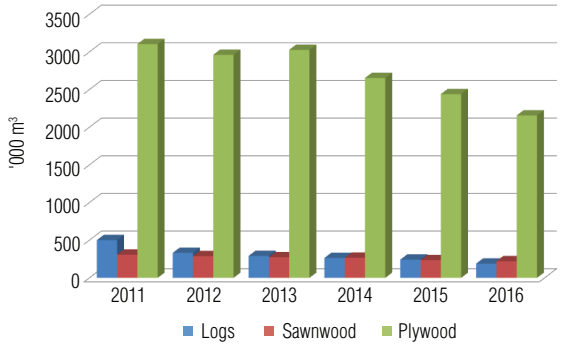
Japan's imports of tropical logs and tropical sawnwood are now dwarfed by tropical plywood imports, mainly from Indonesia and Malaysia. There were steady declines in imports of tropical logs (-60%) and sawnwood (-30%) between 2011 and 2016, and plywood imports from tropical countries fell by 30% over the same period (Figure 2).

Figure 1: Month-on-month growth in urban home and apartment construction, Japan, 2016



Source: Ministry of land Infrastructure and Tourism, Japan.

Figure 2: Japan's imports of tropical logs, sawnwood and plywood, 2011–2016



Source: Ministry of Finance, Japan.

Furniture imports

The choice of currency has a major impact on interpreting trends in imports. Put simply, as the yen weakens against the US dollar, the value of imports denominated in yen increases while the value of imports in dollars decreases. The yen/US dollar exchange rate swung from around ¥80 per dollar in 2012, to ¥120 per dollar in 2015, and back to ¥111 per dollar in 2016.

Wooden furniture imports slid, in dollar terms, between 2012 and 2016 (Figure 3). Even in the run-up to the 2014 increase in sales tax in Japan, there was no appreciable up-tick in the import value of wooden furniture, although the pace of decline moderated slightly.

ASEAN snapshot

Asian suppliers dominate Japan's wooden furniture imports. Exports from China to Japan are significant, but the success of Association of South East Asian Nations (ASEAN) suppliers in the very demanding Japanese market is often overlooked.

ASEAN marks its 50th anniversary in 2017. Since its formation, ASEAN has grown from an underdeveloped region into one of the most dynamic drivers of the global economy. The success story continues: today, ASEAN's ten member countries—Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam—are a significant focus of international investment.

ASEAN is a fast-expanding trade bloc in Asia, and it has growing economic clout. With a combined population of over 620 million, ASEAN's aggregate gross domestic product surpasses US$2.4 trillion, with average annual growth of around 5% over the past decade. Intraregional trade was boosted by the formation of the ASEAN Economic Community in late 2015, the aim of which is to create a single market enabling goods, services, investments, capital and people to move freely throughout the region.

Much of ASEAN's success in the export of manufactured goods such as wooden furniture is the result of inward investment in manufacturing. ASEAN's share of global foreign direct investment (FDI) inflows increased from 5% in 2007 to 12% in 2015. Multinational companies are increasingly choosing ASEAN as an alternative production base to China.

Although overall FDI inflows to ASEAN members fell by 8% in 2015, to US$120 billion, the value of FDI in manufacturing continued to rise, with many multinational enterprises expanding their activities in the region. Investments from Australia, China, India, Japan, the Republic of Korea and New Zealand increased by 11% in 2015, to US$40 billion. Those six countries are prospective partners with ASEAN in the Regional Comprehensive Economic Partnership, an alternative to the Trans-Pacific Partnership.

Japan is the single-largest source of investment in the ASEAN region and its third-largest trading partner. ASEAN is an important production hub for Japanese multinationals selling into the dynamic regional markets as well as a production base for exports back to Japan. Japanese firms have provided significant opportunities for employment, technology transfer and skills development. Some of the more recent members of ASEAN still struggle with underdeveloped institutional and infrastructure capacity, which deters investors. Despite this shortcoming, newer members of ASEAN are seeing the fastest growth in Japanese investment.

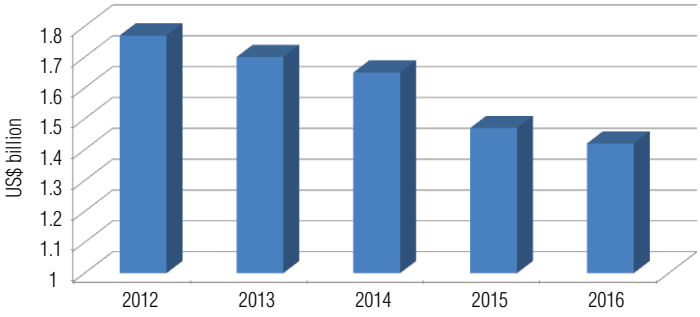
New opportunities for expanded trade offered by the ASEAN Economic Community and the Regional Comprehensive Economic Partnership require action to harmonize and simplify trade rules, encourage infrastructure investment, strengthen trade in services and increase labour mobility.

ASEAN and China vie for Japan's timber market

The tough competition provided by ASEAN exporters in the Japanese market is a lesson for all producers in how the dominance of the Chinese manufacturing engine can be challenged successfully. Manufacturers in ASEAN have found that healthy competition can lead to higher productivity and successful market development, which is good for profits, jobs and consumers, who have a wider choice of well-made products.

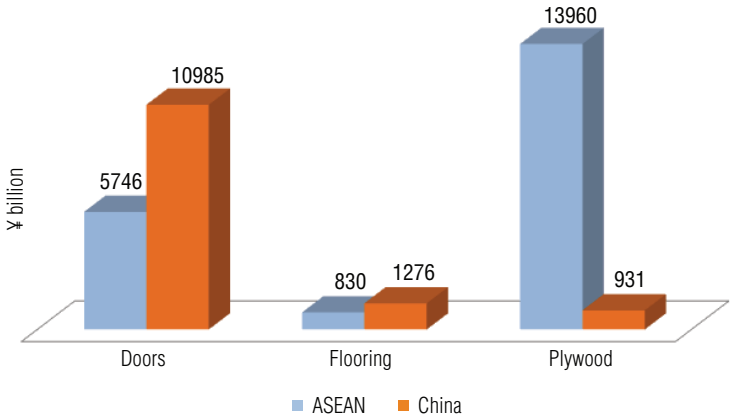
Import data from Japan's Ministry of Finance allow a comparison of imports from ASEAN countries with the major Chinese suppliers of most joinery items and wooden furniture. Although shippers in China come top for most categories of wood products, there are some interesting exceptions where ASEAN shippers have held onto long-established dominant positions and an ASEAN newcomer has displaced China as number one.

Figure 3: Wooden furniture imports, Japan, 2012–2016



Source: Ministry of Finance, Japan.

Figure 4: Japan's imports of doors, flooring and plywood, ASEAN countries and China, 2016



Data source: Ministry of Finance, Japan.

Joinery and plywood

Between 2012 and 2016, ASEAN shippers maintained a steady share of the Japanese market for wooden doors at around 30%. Japan's wooden-door imports peaked in 2013 as importers anticipated a rush in house-building in the lead-up to the increase in consumption tax, which pushed up the cost of new homes by 3%. Door imports began to fall in 2013, and the decline continued to 2016. Interestingly, however, shippers in China suffered the fastest decline in wooden-door exports to Japan, with Japan's imports from China falling by almost 10% in 2013, compared with only 2.5% for imports from ASEAN.

The pattern of Japan's imports of assembled flooring between 2013 and 2016 is similar in some ways to that of door imports: in a falling market, Chinese shippers lost market share and ASEAN shippers maintained their existing share at 38–40%. Moreover, ASEAN shippers increased their sales of assembled flooring in the Japanese market in 2016, despite an overall fall in flooring imports.

Despite having the lion's share of the imported plywood market in the European Union (EU) and the United States, China loses out to ASEAN shippers—especially those in Indonesia and Malaysia—in the Japanese market for imported plywood (Figure 4). For the past decade, ASEAN shippers have consistently held around 85% of Japan's imported plywood market, with China making up about 75% of the balance.

With such a large market share, ASEAN plywood shippers have immediately felt the impact of changes in demand in Japan. Total plywood imports into Japan topped 3 million m^3 in 2013, but there has been a steady decline since.

The pace of decline in plywood imports eased in 2016 as more plywood was required for government construction projects and for projects related to the Olympic Games, which will be held in Tokyo in 2020.

Wooden office furniture

ASEAN shippers' share of Japanese imports of wooden office furniture (HS 940330) has been whittled away by shippers from China, the market share of which rose from around 35% in 2012 to over 60% in 2016. The share of ASEAN shippers in this market has never been more than the 10–12% achieved in 2012. EU exporters have had some success in Japan's wooden office furniture market, with Portugal and Poland capturing a small market share.

Japan's imports of wooden office furniture peaked in 2014 and then fell in 2015 and 2016. Despite the overall decline in demand, Chinese shippers have managed well; after a dip in exports in 2015, sales rose in 2016.

Kitchen furniture

Nor do Chinese exporters have it all their own way in the Japanese market for kitchen furniture (HS 940340). ASEAN suppliers dominate imports in this segment: since 2012, they have consistently held a market share exceeding 70%, seeing off exporters in China, the EU and the United States.

In the five years since 2012, Viet Nam has become a major player in the furniture export market, with shippers from that country providing more than half the kitchen furniture shipped from ASEAN to Japan in 2016. According to the ASEAN Furniture Industries Council, Viet Nam became ASEAN's largest exporter of timber and wood products in 2016, with US$3.9 billion in export sales.

Japan's wooden kitchen furniture imports rose sharply in 2013 but then weakened. ASEAN's exports continued to gain market share, however, even in the face of this overall weaker demand.

Wooden bedroom furniture

Japan's market for imported wooden bedroom furniture (HS 940350) is yet another battleground, with Chinese and ASEAN suppliers looking to increase market share. Chinese exporters had the edge on ASEAN exporters—even Viet Nam—in 2012–2016. At around 55% of all wooden bedroom furniture imports, China's market share was remarkably constant over the period. Exports from ASEAN hovered at around 37%; this, combined with exports from China, left little room for the rest of the world.

Japan's imports of bedroom furniture peaked in 2015 and dipped slightly in 2016. Despite the dip, Chinese and ASEAN shippers maintained their market shares.

Will anyone gain a competitive edge from Japan's Clean Wood Act?

Japan's Clean Wood Act—designed to promote the distribution and use of legally harvested wood products—came into effect in May 2017. Despite controversy surrounding the Act because participation is voluntary, it is almost certain that all importers will comply.

The Act applies to traders and users of wood products, such as manufacturers, distributors, house-builders, companies and contractors. This is not a regulation like the Building Standards Act, however: companies deciding to comply can register and define how they propose to verify the legality of products.

As the Clean Wood Act is rolled out, pressure will mount on suppliers to verify the legality of their wood products. On the face of it, shippers with credible chain-of-custody and legality verification systems seem well placed to gain a competitive advantage over shippers that lack these.

The Chinese government is making progress in its efforts to tackle illegal logging and associated trade. Systems are in place for chain-of-custody tracking for timber from domestic sources, but the government and associations are yet to introduce a credible framework that would eliminate imports of illegal wood-based products. China's private sector is taking action, with the growing adoption of chain-of-custody certification to help maintain export market share. Industry associations are promoting legal and sustainable sourcing, and they will have an important role to play in the development of timber legality verification systems in China.

ASEAN suppliers are more advanced in legality verification. ASEAN countries long ago committed to developing national standards on timber legality, and some already have internationally recognized systems in place. Indonesia's timber legality system has met the requirements of the EU's Forest Law Enforcement, Governance and Trade (FLEGT) initiative. A timber legality assurance system has been in place in Peninsular Malaysia since 2013. Viet Nam also has such a system, and Thailand is well advanced in discussions with the EU on a voluntary partnership agreement (VPA) under the FLEGT initiative. Lao PDR is finalizing its legality definition and is hoping to conclude VPA negotiations with the EU in 2018. Cambodia, Myanmar and the Philippines are all taking steps to strengthen their national timber legality assurance systems.

Probably no advantage for any supplier

Against this backdrop, it would seem that ASEAN shippers would have an advantage, but—as always in Japan—there is a twist in the new proposal on legality. In interpreting the likely impact of the Act, the Japan Lumber Report has found a wriggle-out clause, which it has translated as, "Wood products, which are not proven even after efforts to seek legality, can be handled as long as they are separated from legal products". Do not, therefore, expect any immediate change in the current pattern; nevertheless, suppliers will eventually need to address the concerns of Japanese buyers on legality.

Prospects for Japan's economy brighten …

The Japanese economy posted its best quarterly performance in three years in the first quarter of 2017. New business investment and hiring remained steady in March 2017, building on the trend in the first two months of the year. Against this background, the Bank of Japan raised its growth forecast at its April meeting to 1.6%, up from 1.5% projected in January.

According to the Cabinet Office, consumer confidence in Japan improved more than expected in March, rising to a three-year high. All components of the consumer confidence index trended higher, with indexes for income growth, employment, willingness to buy durable goods and overall livelihood rising surprisingly sharply. The boost in consumer confidence stems partly from a decline in unemployment and, because inflation is minimal, households feel that their disposable income is stable. The main downside to an even bigger boost in consumer confidence is low wage growth, following the latest round of wage negotiations with unions.

The good news continues, with the International Monetary Fund (IMF) raising its forecast for Japan's GDP growth this year. The IMF cautions, however, that, "in spite of the rebounding output and the tightening labour market, consumer prices and wages have stayed almost flat."

As Japan's economy heads into the second quarter, prospects seem to have improved. Nevertheless, the good news could be undone if protectionist statements out of the United States are translated into policies that hinder exports from Japan.

... but first-quarter 2017 timber imports disappoint

Despite the positive economic sentiment, import data suggest that importers of builders' woodwork and furniture are yet to be convinced that markets are about to take off. Japan's imports of wooden doors (HS441820) and wooden windows (HS441810) fell in the first quarter of 2017, although, surprisingly, imports of assembled flooring rose sharply, year on year.

The rise in imports of wooden office furniture in the first quarter mirrors the rise in business sentiment and investment. The decline in imports of wooden kitchen and bedroom furniture similarly reflects subdued consumer sentiment.

Two issues—aging and a declining population—have been affecting the Japanese furniture market for a long time. A third factor has emerged in recent years: the decision of many young people to delay marriage. Aging and population decline reduces market size, but this third factor has wider implications.

The number of single-family households in Japan has grown from insignificant to almost 25% in a decade, and this sharp demographic change is changing furniture-buying habits. Young singles tend to minimize expenditure on furniture, but those marrying later (for example in their 30s) have more disposable income and seek distinctive, up-market furniture. The market is becoming increasingly polarized between high-value-added products and low-priced products, a trend that will become more pronounced if the Japanese economy does not strengthen.

Heightened geopolitical risks for Japan

Notwithstanding military provocation in the Democratic Republic of Korea and the risk posed to the EU by an upset in the French presidential election, unease over the likely direction of United States trade policies dominated recent discussions between finance ministers and central bankers. Sustained growth in Japan depends largely on domestic spending but, with consumer sentiment weak, exports are propping up the economy. Exports will be affected if the Trump administration attacks the Japanese trade surplus, which will dampen growth prospects.

Recent editions

Compiled by Ken Sato

Tennigkeit, T., Streck, C., Gromko, D., Haupt, F., Held, C., Meier, E. & Pistorius, T. 2017. *Harnessing the potential of private sector engagement in productive forests for green growth*. International Bank for Reconstruction and Development/The World Bank, Washington, DC, USA.

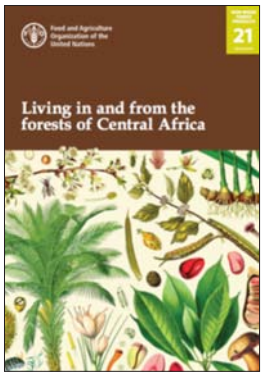
Available at: www.profor.info/content/harnessing-potential-private-sector-engagement-productive-forests-green-growth

This policy brief presents key messages on the promotion and green-growth potential of harvested wood products, including findings from study countries. The brief, which was written by a team from UNIQUE and Climate Focus and commissioned by the World Bank Group's Forest Investment Program, includes contributions from experts worldwide. Among its key messages is that an increase in the consumption of harvested wood products would be an effective climate-change mitigation strategy by increasing the sequestration of carbon in productive forests; increasing carbon sequestered in harvested wood products through the lifespan of those products; and substituting for carbon-intensive materials (such as concrete and steel).

CIFOR 2017. *CIFOR priorities 2017: advancing research for forests and people*. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Available at: www.cifor.org/publications/pdf_files/Papers/PCIFOR1701.pdf

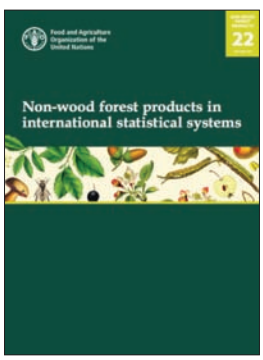
CIFOR priorities 2017 is a companion document to the CIFOR Strategy 2016–2025. Priorities are updated annually and produced as an internal guide, for external consumption, and to support fundraising goals. The 2017 edition is the first developed after the 2016–2025 strategy, and it goes beyond research by presenting priorities for CIFOR's three pillars (research for impact, capacity development, and outreach and engagement) in terms of both geography and content.



FAO 2017. *Living in and from the forests of Central Africa*. Rome.

ISBN: 978-92-5-109489-1
Available at: www.fao.org/3/b-i6399e.pdf

This publication is devoted to the development of peoples through the promotion of non-wood forest products (NWFPs) in Central Africa with a view to boosting food security and alleviating poverty. It brings together knowledge and information on NWFPs and those who harvest, use and consume them. It pays tribute to the unflagging strength and intelligence of the Bantu, Baka-Bandjeli and Bororo-Wodaabe peoples and, by extension, to all the "lords of the forest" of Central Africa. Over the generations, these peoples have developed a body of knowledge that has enabled them to live in and from the forests and their biodiversity while preserving and enhancing them.



Sorrenti, S. 2017. *Non-wood forest products in international statistical systems*. Non-wood Forest Products Series No. 22. FAO, Rome.

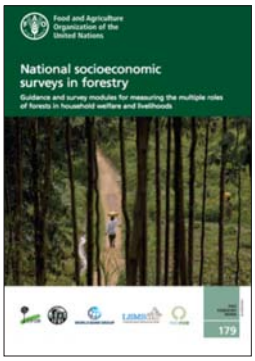
ISBN: 978-92-5-109602-4
Available at: www.fao.org/3/a-i6731e.pdf

The ultimate aim of this report is to improve the overall availability and quality of international statistics on non-wood forest products for evidence-based decision-making.

Pandey, K.K., Ramakantha, V., Chauhan, S.S. & Kumar, A.A.N. (eds.) 2017. *Wood is good: current trends and future prospects in wood utilization*. Springer, Singapore.

ISBN: 978-981-10-3115-1
Available at: www.springer.com/us/book/9789811031137#aboutBook

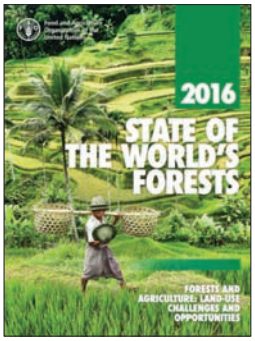
This book is a compilation of papers presented at an international conference of the same name addressing recent innovations, trends and challenges in wood science. The papers are grouped into five categories: wood properties and variability; wood protection; wood-based composites; wood utilization pattern; and wood and climate change. With an increasing human population and growing demand for wood, this book offers insights into the efficient use of wood. It will be useful to researchers, professionals and policymakers involved in forestry and wood-related areas.



FAO 2016. *National socioeconomic surveys in forestry: guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods*, by R.K. Bakkegaard, A. Agrawal, I. Animon, N. Hogarth, D. Miller, L. Persha, E. Rametsteiner, S. Wunder & A. Zezza. FAO Forestry Paper No. 179. Rome.

ISBN: 978-92-5-109438-9
Available at: www.fao.org/3/a-i6206e.pdf

This publication, led by the FAO Forestry Department and developed collaboratively with the Center for International Forestry Research, International Forestry Resources and Institutions, and the World Bank's Living Standards Measurement Study (LSMS) and the Program on Forests, presents a set of survey modules on forest and wild products. The modules are discussed primarily in relation to LSMS-type surveys, but they are also applicable to a wide range of multi-topic household surveys and should allow the generation of precise, comparable, reliable data. The hope is that countries and other institutions working in this field will use the modules and guidance in this sourcebook to help close the information gap on the multiple relationships between household welfare and forests, enabling greater consideration of the role of forests in sustainable development strategies and policies.



FAO 2016. *State of the world's forests 2016. Forests and agriculture: land-use challenges and opportunities*. Rome.

ISBN: 978-92-5-109208-8

Available at: www.fao.org/documents/card/en/c/ffed061b-82e0-4c74-af43-1a999a443fbf

This report explores the challenges and opportunities represented by the complex interrelationships between forests, agriculture and sustainable development. It demonstrates that the sustainable management of both forests and agriculture, and their integration in land-use plans, is essential for achieving the Sustainable Development Goals, ensuring food security and tackling climate change. The report shows it is possible to increase agricultural productivity and food security while halting and even reversing deforestation, highlighting the successful efforts of Costa Rica, Chile, the Gambia, Georgia, Ghana, Tunisia and Viet Nam. Integrated land-use planning is the key to balancing land uses, underpinned by the right policy instruments to promote both sustainable forests and sustainable agriculture.

Meetings

11–13 July 2017
Forest Regeneration in Changing Environments
Corvallis, USA
Contact: blogs.oregonstate.edu/forestregen2017

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

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

22–27 July 2017
23rd Meeting of the CITES Plants Committee
Geneva, Switzerland
Contact: www.cites.org/eng/news/calendar.php

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

20–25 August 2017
12th International Congress of Ecology
Beijing, China
Contact: www.intecol2017.org/en/index.asp

27–31 August 2017
Symposium on Systems Analysis in Forest Resources
Suquamish, USA
Contact: http://depts.washington.edu/ssafr17

6–16 September 2017
13th Conference of the Parties of the United Nations Convention to Combat Desertification
Ordos, Inner Mongolia, China
Contact: www2.unccd.int/cop13

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

12–14 September 2017
3rd Restoring Forest: Regeneration and Ecosystem Function for the Future
Lund, Sweden
Contact: https://reg.akademikonferens.se/restoringforest2017

12–15 September 2017
DANA Africa Forest Industry Investment Conference
Kruger National Park, South Africa
Contact: https://danaevents.co.nz/2017southafrica/index

13–17 September 2017
2nd Asia-Pacific Urban Forestry Meeting
Seoul, Republic of Korea
Contact: www.fao.org/forestry/events

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

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

21 September 2017
European Sustainable Tropical Timber Coalition Conference 2017
Aarhus, Denmark
Contact Joyce Penninkhof at: joyce.penninkhof@probos.nl

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

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

3–6 October 2017
3rd International Conference on Scaling-up Global Efforts to Secure Community Land and Resource Rights
Stockholm, Sweden
Contact: http://rightsandresources.org/en/event/scaling-up-strategies-secure-community-womens-land-rights/#.WVBlmBOGNTY

4–6 October 2017
European Forest Institute 2017 Annual Conference
Oslo, Norway
Contact: www.efi.int/portal/members/annual_conferences/2017

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

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

12–13 October 2017
Solutions for Wood Mobilisation in Europe
Paris, France
Contact: http://simwood.efi.int

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

17–19 October 2017
Washington Forest Legality Week 2017
Washington, DC, USA
Contact: www.wri.org

18–19 October 2017
Ninth Carbon Dioxide Utilisation Summit
Reykjavic, Iceland
Contact Rohan Baryah at: rbaryah@acieu.net

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

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

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

6–9 November 2017
Drylands, Deserts and Desertification 2017
Ben-Gurion University of the Negev, Israel
Contact: http://in.bgu.ac.il/en/desertification/Pages/default.aspx

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

13–17 November 2017
PEFC Forest Certification Week
Helsinki, Finland
Contact: http://pefc.fi/pefcweek

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

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

28–30 November 2017
53rd Global Environment Facility Council Meeting
Washington DC, USA
Contact: www.thegef.org/events/53rd-gef-council-metting

28–30 November 2017
European Paper Week 2017
Brussels, Belgium
Contact: www.cepi.org/EPW

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

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

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

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

23–31 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/news/united-arab-emirates-to-host-next-ramsar-cop13-in-2018

7–22 November 2018
14th Meeting of the Conference of the Parties to the Convention on Biological Diversity
Sharm El-Sheikh, Egypt
Contact: www.cbd.int/meetings

29 September–5 October 2019
XXV IUFRO World Congress 2019
Curitiba, Brazil
Contact: www.iufro.org/events/congresses/2019

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