TFU

Promoting the conservation and sustainable development of tropical forests

ISSN 1022–5439

TROPICAL FOREST UPDATE Vol. 32 No. 3 and 4 2023

Strengthening tropical timber supply chains

As 2023 draws to a close, economic uncertainty and political tensions are clouding the outlook for global trade, including for tropical timber. Instead of focusing on "building back better" after the COVID-19 pandemic and stepping up climate action in the face of alarming global temperature records, many countries are wrestling with issues including persistent inflation, high interest rates, and fallout from the war in Ukraine and the crisis in the Middle East.

In an interconnected world, it is impossible to completely shield economies and livelihoods in any country from the impacts of global turbulence. Nonetheless, the resilience of people and communities to shocks, whether natural or human-made, can be increased. For millions of people who rely on tropical forests for income and employment, strengthening global supply chains by making them more sustainable and transparent is part of the solution.

As set out in ITTO's 2022–2026 Strategic Action Plan, creating legal and sustainable supply chains (LSSCs) is vital to improving governance and boosting investment for the conservation of tropical forests and the increased use of tropical timber. Under a dedicated LSSC programme, ITTO is assisting tropical timber-producing countries, operators, and forest-dependent communities to secure the policies, tools and financial support needed to realize this vision.

Several LSSC-related initiatives are featured in this edition of Tropical Forest Update alongside examinations of tightening regulations in the main tropical timber markets and of developments in global timber trade. In the lead article on page 3, Japan's Forestry Agency describes how the Clean Wood Act has been revised to make it even harder for illegally harvested timber to enter the country. Amendments to the 2017 law mean that more Japanese businesses—including importers, sawmills and retailers—must ensure the legality of the timber and wood products that they handle.

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Printed on PEFC matt coated paper using vegetable-based soya inks.

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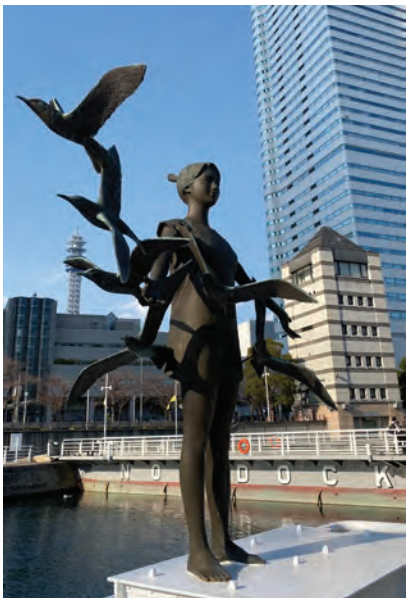
Cover image: Not just a particle board, also a solution. Legal and sustainable tropical timber supply chains provide sustainable wood products to consumers worldwide and strengthen sustainable forest management practices in the tropics. *Photo: J.C. Claudon/ITTO*

Above: View of Minato-Mirai, Yokohama. *Photo: R. Carrillo/ITTO*

To meet tough standards in markets such as Japan, the European Union and the United States of America, ITTO is helping tropical timber-producing countries to demonstrate the legality and sustainability of their timber. Starting on page 7, Claude Kachaka Sudi Kaiko and Désirée Nkwinkwa describe how the capacity-building component of ITTO's LSSC programme has produced a training module tailored for countries in the Congo Basin. Dissemination of the module has begun, with national workshops held in Cameroon, Democratic Republic of the Congo, Republic of the Congo, Gabon and Central African Republic, however further funding is needed for its wider circulation and adoption.

A critical element of LSSCs is the ability to track and trace timber at every step along a supply chain, from harvesting, to processing, to end-use. As ITTO Executive Director Sheam Satkuru noted in a recent speech,[1] the Organization has helped establish timber tracking systems in countries in Africa, Asia and Latin America. "We have shown that it can be done in the tropics, and also that such systems improve efficiency across supply chains and combat illegal logging."



In an article on page 17, ITTO Fellow Achmad Solikhin explains how a team of researchers have examined how Indonesia can harness forensic timber technologies to combat attempts to sidestep its timber tracking and legality verification system, including by providing evidence that can be used to prosecute timber-related crime.

Also in this edition, a second article on Indonesia looks at the potential for plantations to produce fuel for biomass energy generation to help the country meet its renewable energy targets; plantation-grown teak is the focus of an article on adding value to tropical timber supply chains to counter economic headwinds; an article on Peru highlights the tantalizing prospect of cultivating mahogany in semi-arid zones; and the regular market trends feature details how China's economic doldrums are upsetting demand for tropical timber.

Countries providing China and other markets with tropical timber cannot escape the fallout from the changing fortunes of major economies. However, by providing a reliable supply of sustainable and verifiably legal timber that counters deforestation and helps protect both climate and biodiversity, they can ensure that they remain trusted partners in a valuable sector, even when times are tough.

[1] www.itto.int/news/2023/10/18/itto_executive_director_says_legal_sustainable_timber_supply_chains_are_key_nature_based_solutions/

Japan strengthens law against illegal logging

New measures in the reformed Clean Wood Act mean that more businesses—including importers, sawmills and retailers—must ensure the legality of timber and wood products

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[1] This article has been translated and edited with the author's permission. It was originally published in RINYA June 2023 No.195, available at: www.rinya.maff.go.jp/j/kouhou/kouhousitu/jouhoushi/attach/pdf/0506-2.pdf

Sustainable supply: Imported timber at Tokyo Port: *Photo: Forestry Agency, Japan*

Illegal logging and the distribution of illegally harvested wood threatens to undermine the legal trade in wood products as well as the multiple functions of forests, including their important role in slowing global warming. The need to address illegal logging has gained considerable international momentum in recent decades, resulting in the enactment of related laws in a number of countries, and remains high on the global agenda.[2]

In Japan, the government started in 2006 to procure wood of verified legality. A decade later, following discussions on promoting the wider use of legal wood, parliament passed a bill which became the Act on Promotion of Distribution and Use of Legally harvested Wood and Wood Products. The Clean Wood Act, as the law is more commonly known, was enacted in May 2017. Now, the Japanese government has amended the law to increase its effectiveness.

The original law

Under the 2017 Clean Wood Act, "wood-related businesses entities" (WBEs) in Japan are expected to check that the wood they handle is legal. More specifically, businesses should verify that wood has been harvested in a manner that conforms to the laws of Japan or the country of origin. This due diligence can include obtaining information such as a notification of logging from a party they acquire wood from, or other relevant information concerning its legality. Businesses must also communicate to parties to whom they hand over wood whether its legality has been verified.

Legal timber: Imported sawn timber at Tokyo Port. *Photo: Forestry Agency, Japan.*

Businesses that comply are eligible to be certified as registered WBEs by an independent accreditor. WBEs are defined as those that manufacture, process, import or sell wood and wood products (retailers are excluded), or use it in construction. Upstream WBEs and wood-related importers are categorized as Type I; all others are classed as Type II (see Figure 1).

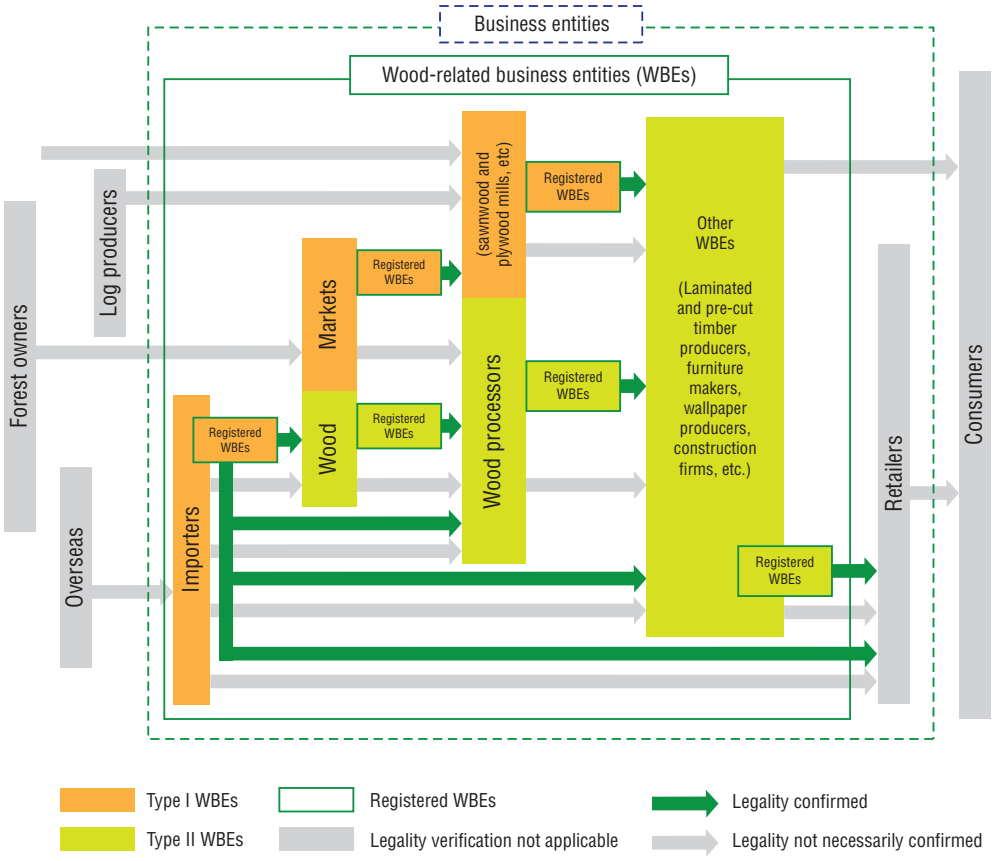
Clean Wood Act in practice

Japan's Forestry Agency has encouraged businesses to verify legality. The agency maintains a website tool called Clean Wood Navi with information including an overview of the Clean Wood Act as well as laws and regulations on logging in major wood-exporting countries.[3] In cooperation with

[2] The G7 Ministers Meeting on Climate, Energy and Environment in April 2023 committed to promote sustainable forest management and wood use, including by addressing illegal logging. See: www.env.go.jp/content/000127828.pdf

[3] www.rinya.maff.go.jp/j/riyou/goho/

Figure 1: Business entities subject to the 2017 Clean Wood Act



relevant organizations, the agency has held seminars and events to encourage businesses to register, and to raise awareness among consumers and other stakeholders.

These efforts have borne some fruit. In 2021, approximately 90 per cent of WBEs that responded to a questionnaire said they were aware of the Clean Wood Act and about 70 per cent agreed with the statement that "it is important to ensure the legality of wood and wood products when selling these items." The share of the wood handled by Type I and Type II businesses with verified legality was 96% and 92%, respectively, showing that WBEs are willing to handle legally harvested wood. In addition, the volume of wood verified as legal by Type I WBEs in 2021 accounted for 44% of national wood consumption, up from 27% in 2018. The number of registered WBEs has increased (to 628 as of June 2023), partly due to incentives including bonus points in subsidy programmes.

On the other hand, the survey of Type I WBEs found that only 60 per cent of respondents successfully identified all of their handled wood as legal. It also revealed variations in how they verified legality: some referred to public filings such as notifications of logging, while others used different sources of information.

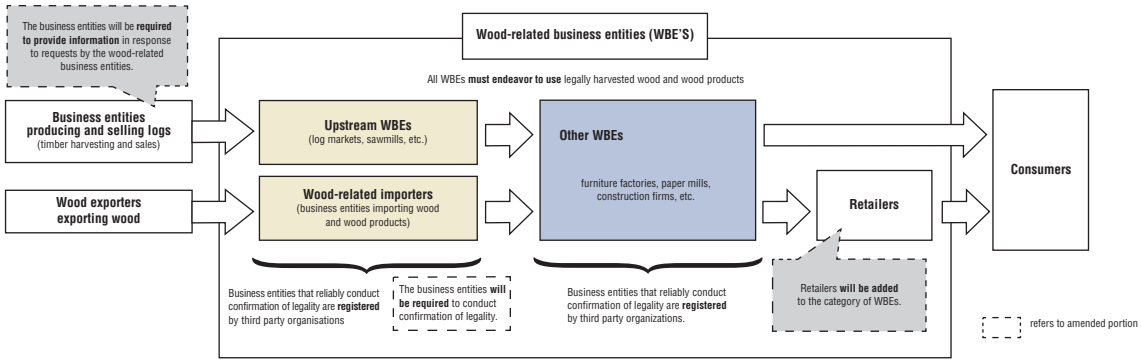
Boosting effectiveness

In 2022, the Ministry of Agriculture, Forestry and Fishery (MAFF), Ministry of Economy, Trade and Industry (METI) and Ministry of Land, Infrastructure, Transport and Tourism (MLIT), studied the Act's effectiveness and consulted with academic experts, industry representatives and other stakeholders. These discussions resulted in a decision to make amendments designed to strengthen Japan's contribution to the global effort to counter illegal logging and help secure a reliable and expanding supply of legally produced wood.

Reflecting these objectives, a new act to revise the Clean Wood Act was passed in April 2023. A date for its enactment is yet to be determined. The act includes several revisions designed to promote the distribution and use of legally harvested wood in domestic supply chains (see also Figure 2):

- Upstream WBEs and wood-related importers must document, keep records on, and share information on their verification of the legality of timber and wood acquired from domestic business entities producing and selling logs and from foreign business entities exporting wood.
- Business entities producing and selling logs must provide WBEs with information on request to facilitate legality verification.
- Retailers have been added to the businesses subject to the law to make information on the verification of legality available to consumers.
- MAFF, METI and MLIT will provide guidance and advice, make recommendations, disclose information, issue orders and penalize violations.
- Upstream WBEs and wood-related importers of a certain size are required to perform periodic reporting.

Figure 2: Major revisions to the Clean Wood Act



Stacked: Processed timber products for export to international markets. *Photo: askoldsb/POND5*

Safeguarding supply

The revisions to the Clean Wood Act strengthen efforts to combat illegal logging. It is now obligatory for upstream WBEs and wood-related importers to conduct confirmation of the legality of the wood they handle. As a result, it is expected that wood of confirmed legality will be widely distributed to the general public, and that demand will further expand as wood can be used with peace of mind. However, it is also essential that wood is supplied in a stable manner to meet domestic demand and that business operators involved in wood distribution do not bear too much administrative burden. Given these considerations, the Forestry Agency will look into the following future actions in conjunction with relevant parties:

- developing a simple flowchart and checklist that show steps and methods to check legality;
- holding corporate information sessions and training programmes, and expanding consultation services; and
- building an easy-to-use system for the electronic transfer of information and storage of records concerning the verification of legality.

Moreover, the Forestry Agency will strengthen its awareness-raising efforts in the hope that the Clean Wood Act will be enforced more effectively, whereby not only businesses but all stakeholders, including consumers, take an interest in the legality of wood.

Building capacity for legal and sustainable supply chains

An ITTO-supported training programme has been rolled out in five countries of the Congo Basin

by Claude Kachaka Sudi Kaiko[1] and Désirée Nkwinkwa[2]

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Spreading knowledge: Participants in the LSSC single training module dissemination workshop in Libreville, Gabon. *Photo: Toussaint Mbangu*

ITTO is implementing a programme on legal and sustainable supply chains (LSSCs) for tropical timber and forest products to unlock their benefits for climate mitigation and biodiversity as well as social and economic development. Under the capacity-building component of the programme, ITTO engaged the Network of Forestry and Environmental Training Institutions in Central Africa (*Réseau des Institutions de Formation Forestière et Environnementale de l'Afrique Centrale* (RIFFEAC)) to produce a training programme aimed at professional and technical staff in the timber sector across the Congo Basin to facilitate their understanding and management of LSSCs for tropical timber products.

The training programme initially consisted of four modules: "Understanding the 'deforestation-free' concept", "Assessing legality and achieving accountability", "From legality to sustainability", and "Markets and market access".[1] The four modules were subsequently consolidated in a single training module with the title "Training Module on Legal and Sustainable Supply Chains (LSSC) in the Congo Basin".

Structured workshops

Dissemination of the single training module began with a series of national workshops in 2022 in five countries across the sub-region, all of them members of ITTO and the Central African Forest Commission (COMIFAC): Cameroon (Douala, 22–23 February); Democratic Republic of the Congo (Kinshasa, 1–2 March); Republic of the Congo (Brazzaville, 8–9 March); Gabon (Libreville, 17–18 March); and Central African Republic (Bangui, 22–23 March).

Each national workshop consisted of two main parts. The first part included the introduction of participants, opening remarks, and general information on collaboration between RIFFEAC and ITTO. The second part featured presentations by an expert consultant and group work on the single training module.

The objective of the workshops was to disseminate the LSSC single training module among forest management stakeholders while also building their understanding of and capacity to implement LSSCs.

Key stakeholders who took part in the workshops included: representatives of the COMIFAC Executive Secretariat; representatives of national forest administrations; representatives of organizations of private-sector forestry operators; teaching staff from training institutions; and civil society representatives involved in the forestry sector.

During each workshop, a senior consultant introduced the LSSC single training module, explained the LSSC concept and described key challenges for its realization. The consultant also informed stakeholders about what is required to implement LSSCs successfully.

A four-course module

The LSSC single training module is divided into four courses, each consisting of several chapters (Table 1). Developed primarily for forest engineers, the courses may need to be adapted for use with other stakeholders and target groups.

[1] The four-module programme is described in detail in TFU 31-3, available at: www.itto.int/tropical_forest_update. The four modules and the consolidated one are available at www.itto.int/resources/learning-materials.

Table 1: Content of the LSSC single training module

Course I: Definition-based approach to the zero-deforestation concept	Course II: Assessing legality	Course III: Stakeholder accountability and supply-chain sustainability	Course IV: Markets and market access
Chapter 1A: International developments in forests and climate change	**Chapter 2A:** Legality concepts: definitions, scope, attributes, legal and sustainable supply chains	**Chapter 3A:** Concepts of accountability and sustainability	**Chapter 4A:** Timber trade: challenges and market changes
Chapter 1B: Forest landscape restoration and sustainable forest management (SFM)	**Chapter 2B:** Forest tax in timber producer countries	**Chapter 3B:** Role of ITTO Criteria & Indicators for SFM and other guidelines, including reduced impact logging (RIL)	**Chapter 4B:** Trade statistics and market information
	Chapter 2C: Tracking and traceability of primary timber product flow to market final users	**Chapter 3C:** Tools and technologies for forest management and planning	**Chapter 4C:** Global Green Legal and Sustainable Supply Chain Platform
	Chapter 2D: Importance of coding for trade and market transparency	**Chapter 3D:** Use of innovative technologies in chain of custody certification (handheld equipment, GPS, satellite technology, genotypes, etc.)	**Chapter 4D:** Innovative mechanisms for timber marketing
	Chapter 2E: International regulatory requirements for timber and timber products (European Union Timber Regulation (EUTR), Revised Lacey Act, Clean Wood Act, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), etc.	**Chapter 3E:** Certification systems and requirements	**Chapter 4E:** Customs, tariff and non-tariff measures in international and intra-African timber and timber products trade

Key concepts

The workshops explored key area covered in the single training module, including the legality and sustainability concepts that underpin LSSCs. LSSCs require SFM to ensure sustainable development and biodiversity conservation. In this context, laws and regulations need to be implemented in producing and consuming countries to ensure resource sustainability. Establishing LSSCs helps to minimize adverse social and environmental impacts, and address issues such as water and energy use, pollution, labour conditions, biosecurity, marginalized people, biodiversity and land use.

LSSCs encompass organizations, activities and operations associated with all stages of a business process, including the planning, sourcing, processing, manufacturing and delivery of goods and services. Participants at the workshops felt that industrial timber production chains in Congo Basin countries could be divided into four main levels: upstream, downstream, meso and transverse levels. Various categories of stakeholders operate at each level, depending on their activities. Economic operators holding access permits to forest timber resources are active at the upstream level. Economic operators processing timber (logs) into products (sawn timber, veneer, plywood, furniture, etc.) are found at the meso level. The downstream level comprises exporters of unprocessed and processed timber products, and timber product traders or brokers. Transport operators moving logs or processed products operate all along the sub-region's timber production chain.

Regarding regulations, the workshops examined notions of timber legality in the context of existing forest codes in Congo Basin countries, as well as international legal instruments, in particular the Convention in International Trade in Endangered Species of Wild Fauna and Flora (CITES) and regulations in key markets such as the European Union, the United States of America and Japan.

Next steps

Feedback from workshop attendees indicated that the information provided about the single training module as well as the discussion of the opportunities and challenges of establishing LSSCS in the region had been interesting and informative. Stakeholders recommended that the courses be adapted to national contexts and targets and that workshops be held for individual stakeholder groups.

To further the implementation of LSSCs in the Congo Basin, the single training module will be made available in hard copy to enable its dissemination among stakeholders. It is also hoped that COMIFAC will introduce the single training module to its Council of Ministers and thus encourage its integration into the training curricula of forestry training institutions across the sub-region.

The new Regional Coordinator of RIFFEAC, Felix Koubouana, who was elected in March 2023 to succeed Claude Kachake Sudi Kaiko, has been interacting with the France-Gabon Co-Facilitation of the Congo Basin Forest Partnership (CBFP) regarding financial support. Such support would allow the RIFFEAC Secretariat to

Chain of benefits: Established LSSCs can help address a wide range of issues such as water and energy use, pollution, labour conditions, biosecurity, marginalized people, biodiversity and land use. *Photo: ENEF Mbalmayo*

implement the abovementioned recommendations of workshop attendees, under the first of five priority areas of the CBFP 2023–2025 Roadmap ("Promote dialogue and scientific cooperation relating to the Congo Basin forests"), which was approved in July 2023.

The ITTO activity that produced the single training module was made possible by funding from the Government of Japan.

The LSSC single training module is available in French on ITTO's website at www.itto.int/resources/learning-materials.

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THE GOVERNMENT OF JAPAN

Tapping biomass energy from Indonesia's forests

An ITTO project explored the potential for—and the obstacles to—developing sustainable energy forest plantations in North Sumatra

by Tetra Yanuariadi[1] and Hiras Sidabutar[2]

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[2] Former national advisor to ITTO Project PD 737/14 Rev. 2 (I)[3]

Talking trees: Project staff in dialogue with tree growers on the potential of energy forest plantations in North Sumatra. *Photo: Rio S.*

Indonesia is experiencing shortages of energy supply, especially electricity. As a result, many regions have been unable to develop their economies as planned. This is particularly true for rural areas, remote regions and isolated small islands. In addition, the country relies heavily on power plants that burn fossil fuels, especially coal, that are not environmentally friendly; and subsidies are needed to keep electricity affordable for ordinary consumers.

To help meet its energy needs, the Indonesian government aims to develop renewable energy, lifting its share in national power generation from 7% at present to 15% by 2025. The forestry sector is expected to support this initiative by making efficient use of available forest resources.

In the province of North Sumatra, wood-based biomass energy has potential to help alleviate the energy crunch. However, the province's forestry sector must overcome challenges including unsustainable woodcutting and shortages of know-how and investment.

The ITTO project "Developing supply capacity of wood-based biomass energy through improved enabling conditions and efficient utilization of degraded forest lands involving local communities in North Sumatra Province of Indonesia" was implemented from October 2017 to September 2021, to increase the contribution of the forestry sector to renewable energy supply and regional economic development through increased supply of wood-based biomass energy.

In particular, the project was designed to initiate the development of a sustainable supply of wood for energy; provide labour with the skills to develop the sector; and promote the necessary investment.

Sustainable supply

Indonesia's forestry sector has the potential to provide significant amounts of renewable energy by growing trees on degraded, unproductive land both within and outside of permanent forest estates. Expanding wood-based energy is also consistent with the government's economic development strategy, which stresses pro-growth, pro-jobs and pro-environment principles.

To help secure a sustainable supply of wood for energy in North Sumatra province, project managers decided to establish energy forest plantations (EFPs) on suitable and available land across the region. To further augment supply, non-forest sources would also be utilized in close collaboration with growers of rubber and palm oil.

The tree species promoted were gamal (*Gliricidia sepium*), kaliandra (*Calliandra callothyrsus*) and lamtoro (*Leucaena leucocephala*). The criteria employed in selecting the species were: calorific content, site requirements and silviculture techniques. Available information indicated that the calorific contents of the species were 4900, 4720 and 4464 cal/kg, respectively; these species do not require specific site conditions in terms of soil and climate; and silviculture techniques for growing the species are available and easy to apply.

Under the project, a total of 33 ha of EFP was established at three forest management units (FMUs): 9 ha at Simalungun FMU, 12 ha at Humbang-Hasundutan FMU, and 12 ha at Tapanuli Selatan FMU.

Growth and development of the plantations were monitored every 4 months after planting and at 30 months; the survival rate of the species at different FMUs is presented in Table 1.

[3] Dr Sidabutar, a former ITTO staff member, passed away in February 2023 (see obituary at: www.itto.int/news/2023/02/22/vale_hiras_sidabutar/). His contributions to this project and to ITTO are greatly appreciated.

Table 1: Survival rate of the species planted at different FMUs

FMU	Species	Survival rate (%) at different ages (months)				
		4	12	20	24	30
Simalungun	Gamal	88.6	76.4	58.1	52.5	51.9
	Kaliandra	84.3	75.3	57.9	54.5	53.8
	Lamtoro	73.3	67.4	*	*	*
Humbang-Hasundutan	Gamal	77.9	74.3	*	*	*
	Kaliandra	74.2	71.9	*	*	*
	Lamtoro	72.1	69.4	*	*	*
Tapanuli Selatan	Gamal	84.7	67.0	52.1	44.6	44.0
	Kaliandra	81.3	61.3	48.3	43.5	43.3
	Lamtoro	78.1	66.7	*	*	*
All FMUs	Gamal	83.8	55.6	55.6	48.6	48.0
	Kaliandra	79.9	53.1	53.1	49.0	48.5
	Lamtoro	74.5	67.8	*	*	*

* species did not survive

Growing energy: Monitoring tree survival and development in a pilot energy forest. *Photo: Rio S.*

At age 4 months, the overall survival rates for gamal and kaliandra were quite high at 84% and 80%, respectively, but fell sharply to below 50% at age 30 months. The survival rate for lamtoro was also high after 4 months, but all of the planted trees of this species died before reaching 20 months at each of the three sites.

Close examination of how the three species fared at the different FMUs indicated the following:

- The Humbang-Hasundutan site was not fully suitable for any of the species due mainly to insufficient light, low daytime temperatures, and high humidity.
- The Simalungun site was generally suitable for growing gamal and lamtoro, although the daytime temperature was somewhat low. The site was fully suitable for growing kaliandra.
- The Tapanuli Selatan site was fully suitable for growing all three species.

The high mortality rate of all three species was generally attributable to factors including a prolonged dry spell after planting and the unsuitability of specific plots within the sites, due to the high acidity and low fertility of soils. Kaliandra, a pioneer species, is strongly intolerant of shade or competition from other species in a poor light environment.

The low survival rates indicate the importance of performing an in-depth species-site matching exercise prior to planting. In addition, plantation establishment and management must be carried out with care, including the treatment of planting sites, the production and handling of planting materials and the maintenance of young plantations. These findings represent a valuable lesson learnt for better practices in EFP development.

Skilled labour

Local communities that depend on forest resources for their livelihoods are considered the primary beneficiaries of wood-based biomass energy development under the project. Community members received training in skills needed for EFP development and for cooperative business management. Benefits flowing to local communities from the development of forest resources should serve as a strong incentive for these people to support sustainable forest management in the area.

To develop local skills, the project first engaged with local communities on the benefits of EFP development. Dialogues were held involving 49 villages in 13 districts of North Sumatra province. This activity was executed with the assistance of the University of Simalungun, located in the city of Pematangsiantar, and supported by forestry extension officers of Aek Nauli Forestry Research Institute and the project field supervisor. The dialogues involved 527 villagers, consisting of 462 men and 65 women (12.3% of the total).

At the outset of the dialogue process, about 58% of participants expressed interest in participating in an EPF programme, while 42% were either hesitant or had no interest, due mainly to the uncertain market for energy wood.

Building livelihoods: Training on beekeeping as a way to boost economic activities in energy forests. *Photo: Rio S.*

However, following individual dialogue sessions, nearly all participants became interested in joining the programme.

The project subsequently rolled out two training programmes. The first shared technical skills for EFP development, including land and soil preparation, planting, maintenance, replacement of dead plants, weeding, fertilization, harvesting, and also bee honey production. A total of 205 farmers took part.

The second training programme covered the management of village cooperatives to support the development of energy wood businesses. In all, 35 farmers' leaders were trained. This was only 70% of the number foreseen, a shortfall caused by the strict enforcement of COVID-19 protocols by local government. A maximum of 40 people were allowed to assemble in one room—35 farmer leaders and five training staff.

Promoting investment

In collaboration with experts from the IPB University of Bogor, a study was conducted to assess the commercial feasibility of wood pellet manufacturing. The scope of the study included the identification of land suitable and available for the development of EFPs in North Sumatra, focused on 13 districts or regencies of the province; the identification of tree species suitable for making wood pellets and for planting on the available land; an analysis of the potential market for wood pellets; and an assessment of the feasibility of investment in a wood pellet industry (see Box 1 for key assumptions made as part of the assessment).

The study envisaged the construction of a wood pellet factory at one of two locations—Sei Mangkei or Gunung Tua forest complex. The sites were proposed based on the distribution of land suitable and available for growing appropriate tree species; the potential supply of energy wood within a radius of 100 kilometres from the factory site; and the capacity of FMUs and local communities to develop EFPs around the planned factory sites.

Box 1: Assumptions in the feasibility study for commercial wood pellet manufacturing

- Steps in the manufacturing process: wood chipping, drying, grinding and pelleting
- Conversion factor of energy wood to wood pellet: 99%
- Lifetime of machinery: 10 years
- Production capacity: 10 tonnes per hour at 100% capacity utilization
- Operating hours: 7 hours per shift, 3 shifts per day, 25 days per month and 12 months per year
- Price of energy wood at log yard in the forest: USD 43/dry tonne
- Selling price of wood pellet at factory: USD 107/tonne at Sei Mangkei and USD 104/tonne at Gunung Tua (the price difference results from the sites' different distance to the seaport)
- Total cost of machinery and facilities: USD 1 629 350
- Real interest rate: 7.5% per annum
- Real prices of inputs and output applied

The results of the study (Table 3), using common financial/investment evaluation methods, clearly indicate that investment in the wood pellet industry is commercially feasible.

However, the feasibility study was conducted during the first half of 2019 and the assumed price of wood pellet—equivalent to about USD 120/tonne, including transport and loading costs as well as export tax—was based on prior market prices. The export price of wood pellet subsequently fell to about USD 90/ton during the 2020–2021 period, as the COVID-19 pandemic impacted economic activities in wood pellet-importing countries such as China, Japan and the Republic of Korea. At this

Table 3: Investment criteria for wood pellet industry

Investment criterion	Unit	Site	
		Sei Mangkei	Gunung Tua
Net present value	USD	5 835	4 347
Internal rate of return	%	32.78	26.68
Benefit-cost ratio	n/a	1.21	1.17
Payback period	Year	2.90	3.40

level, an investment in wood pellet manufacturing at the North Sumatran sites would not have been commercially viable. The feasibility of investment thus depends on factors including a near-term recovery in the wood pellet export price as well as the prospect of appreciable environmental, social and economic benefits in the medium- to long-term.

Accelerating EFP development

The project produced several recommendations and lessons for the development of energy forestry in North Sumatra which may also be applicable elsewhere in Indonesia and in other countries interested in developing renewable energy from the sustainable management of forest resources:

- In EFP development, it is strongly recommended to perform an in-depth species-site matching analysis to ensure the satisfactory growth and development of the species chosen. In addition, care must be taken in areas including the treatment of planting sites, the production and handling of planting materials and the maintenance of young plantations.
- The results of community dialogues in North Sumatra indicate that local communities were enthusiastic to join the EFP development programme provided that a market for the wood energy that they produce is readily available and that the trees grown are legally harvestable. In this light, it is strongly recommended that agencies involved facilitate investment in wood-pellet manufacturing and that authorities allow local communities to harvest the energy forests they develop, especially those established on unproductive state forest lands.
- Creating a wood pellet industry in North Sumatra in the near term may require investment by a state-owned company in the name of the wider social and environmental benefits that are likely to accrue, as economic benefits may only materialize following a revival in wood pellet prices. The government can also promote investment in energy forestry by adopting relevant and effective policies and provide subsidies and other incentives.

Indonesia aims to install 810 MW of renewable power generating capacity by 2025 and has strengthened its commitment to green economic development. By encouraging an increased supply of wood-based biomass energy, this project can help the country to make progress towards both of these important goals.

Project outputs can be found by inserting the project code PD737/14 Rev.2 (I) into the ITTO project search function at www.itto.int/project_search. This ITTO project was made possible by funding from the Government of Japan.

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Boosting the teak value chain

At a global forestry conference, teak experts discussed ways to boost the use of sustainable teak despite global economic challenges

by PK Thulasidas[1] and Tetra Yanuariadi[2]

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[2] ITTO Projects Manager

Adding value: Teakwood planks set out to dry in Luang Prabhang, Lao People's Democratic Republic. *Photo: PK Thulasidas*

Teak plantations have provided a growing source of sustainable tropical timber in recent years, bringing welcome development to the forestry sector across three continents and helping to reduce demand for teak logged from shrinking natural tropical forests. But global economic uncertainty is clouding the prospects for continued expansion.

Meeting this challenge was the focus of a side-event organized by ITTO, the IUFRO Teakwood Working Party, and Teaknet, the international teak information network managed by the Kerala Forest Research Institute, India,[3] during the International Union of Forest Research Organizations All Division 5 (Forest Products) Conference held in Cairns, Australia on 4–8 June 2023.

Global trade in teakwood is estimated at about 1.02 million m^3 per year and is dominated by India, China and Thailand. Public and private sector teak plantations have been raised in about 70 tropical countries, and future supply is expected to come from their 15 to 25-year rotations and from commercial thinning.

Teak experts at the side-event, which was titled "Teakwood quality: global challenges and opportunities", discussed how to further boost the use and value of products made from sustainably harvested teakwood, including through value-added product development and incentive mechanisms for legal and sustainable supply chains. Other topics included genetically improved planting material, processing technologies, trading policies and standards, and international cooperation, partnerships and networking.

Global turbulence

In his presentation, ITTO Projects Manager Tetra Yanuariadi listed the forces that have buffeted timber markets, including the COVID-19 pandemic, the war in Ukraine, inflation, ecosystem degradation, and climate change.

In this environment, taking effective policy decisions to develop the tropical timber industry requires a long-term perspective, Dr Yanuariadi said. Producer countries need to regularly assess the competitiveness of their products in international markets. Optimizing the utilization and improving the productivity of production forests is also important to support the sustainable tropical timber trade, he said.

Teak represents an opportunity to produce quality timber and is thus of major importance to forestry economies, according to Komlan Houelete, Sector Manager, Silviculture and Forest Management, Togo Forest Development and Exploitation Office. In Togo, teakwood is mainly produced by state-owned companies and smallholders, with most exports destined for India, he told the gathering.

Speakers at the side-event also addressed the utilization of forest biomass for bioenergy industry development. Jingxin Wang, Director of the Center for Sustainable Biomaterials and Bioenergy, West Virginia University, reported on research on the optimization of bioenergy supply chains. Using examples from the United States of America, Dr Wang explored the impact of factors including harvesting, logistics and processing on the economic viability and sustainability of the bioenergy sector, and its ability to bring development to rural areas.

Greater Mekong project

PK Thulasidas, representing Teaknet, reported on the collaboration between ITTO, Thailand's Kasetsart University and Teaknet in implementing the project "Enhancing the conservation and sustainable management of teak forests and legal and sustainable wood supply chains in the Greater Mekong Subregion"[4], which was completed in 2022. The

[3] www.teaknet.org

[4] PP-A/54-331, funded by the German Federal Ministry of Food and Agriculture.

Topic of discussion: Teak sawnwood for export at a sawmill in Yangon, Myanmar. *Photo: PK Thulasidas*

Key source: A smallholder teak woodlot in Kerala, India. *Photo: PK Thulasidas*

second phase of the project has recently started and will have a greater focus on the production of high-quality teak timber, including the organization of side-events at the IUFRO World Congress in June 2024 in Stockholm, Sweden, and at the Fifth World Teak Conference, which will be hosted by India in 2025. Teaknet is also working on a new global assessment of teak resources and trade for publication in 2024 (see Box).

The many sessions and discussions during the five-day IUFRO conference highlighted how sustainably managed forests, including tropical forests, deliver many benefits to society, including climate protection in the form of carbon sequestration, materials that can replace carbon-intensive steel and concrete, and biofuels that can reduced demand for fossil fuels. The conference drew more than 300 delegates from 26 countries.

New global teak assessment

Teaknet is currently undertaking a new global assessment of teak resources in about 80 countries across the tropics and of the international teak trade. The study, coordinated by Walter Kollert and S. Sandeep and supported by IUFRO and the Food and Agriculture Organization of the United Nations (FAO), is a follow-up to the study *Teak Resources and Market Assessment 2010* conducted by FAO more than a decade ago.[1]

The 2010 study estimated the area of natural teak forests at 29 million ha across India, Lao People's Democratic Republic, Myanmar and Thailand. Planted teak forests were found to constitute a globally emerging forest resource covering estimated 4.3 million ha, of which 83% were in Asia, 11% in Africa, and 6% in Latin America. Considering the lack of data from 22 teak-growing countries, these figures certainly underestimated the actual area of planted teak forests.

Since then, the international teak sector has undergone significant development. The area of planted teak forests has increased in many countries. International trade in teak roundwood and sawn timber has expanded tremendously, though Myanmar, the most important producer of high-quality teak from natural forests, introduced a log export ban in 2014. These events prompted the 4th World Teak Conference held in Ghana in September 2022 to recommend an urgent update of the 2010 assessment.

The first phase of the study involves engaging experts in each teak-growing country to obtain reliable and consistent data on national teak resources. The data will be collected through a questionnaire available in Chinese, English, French, Portuguese and Spanish. This work is being supported by five regional coordinators.[2]

Growing resource: Stand of ten-year-old teak in a planation near Pothundy dam in Palakkad District, Kerala, India. *Photo: PK Thulasidas*

As many teak plantations are owned or managed by private companies, particularly in South America, it is of important to note that the resource data reported in each questionnaire will be aggregated at national level. Thus, it will not be possible to trace resource data back to any public or private entity within a given country.

Trade data to be included in this report will be captured from official customs records, for instance via the UN Comtrade database, which includes trade data for teak since January 2022.

The assessment is due for completion in the coming months and will be published in 2024 by IUFRO. It is hoped that the findings will provide policymakers, investors and managers with an improved understanding of the important role of teak resources in the economies of many countries.

[1] www.fao.org/3/an537e/an537e.pdf

[2] Nelly Grace Bedijo, Uganda, for eastern, northern and southern Africa; Adzo Kokutze, Togo, for West and Central Africa; PK Thulasidas, India, for Asia and Oceania; Cristiane Reis for Brazil; and Olman Murillo, Costa Rica, for South and Central America, the Caribbean and Mexico.

Migrating mahogany to Peru's arid zones

An ITTO project and private initiatives suggest the overexploited species can grow in plantations away from its native Amazon, brightening the prospects for restoration

by Jorge Malleux

Project Coordinator, professor emeritus, National Agrarian University, Lima, Peru (jmalleux@gmail.com)

Migrating nature: A standing mahohay tree in the Peruvian Amazon. *Photo: Universidad Nacional Agraria La Molina*

Swietenia macrophylla, or big-leaf mahogany, is native to the tropical humid forests of Latin America. In Peru, once one of the biggest producers, decades of heavy and unsustainable logging have almost eliminated the species, known locally as caoba, and all neo-tropical populations of this high-value species are now listed in CITES Appendix II.

To sustain supplies and protect the remaining wild populations, efforts have been made in several countries to grow big-leaf mahogany in plantations. The species has particular requirements in terms of temperature, humidity, soil texture and soil acidity. Provided the average annual temperature lies around 21–25 ºC, the trees' needs can also be met through soil conditioning and irrigation. However, cultivating big-leaf mahogany has been dogged by *Hypsipyla grandella*, a moth whose larvae (also known as the mahogany or Meliaceae shoot borer) infest and damage nearly all of the trees in a stand, defying biological, mechanical and genetic efforts to control it.

More recently, the success of plantations on the Pacific island of Fiji, whose geographic isolation has so far prevented infestation by *Hypsipyla grandella*, has suggested that the species could also be cultivated in drier areas of its native range to keep the insects at bay. This hypothesis was examined during as part of a recently completed ITTO project[1] to design a strategy for the restoration and rehabilitation of degraded ecosystems in the coastal regions of southern Peru in support of the country's wider climate mitigation and adaptation goals.

[1] PD 852/17 Rev. 4 (F) "Development of a regional strategy for the restoration and rehabilitation of degraded areas on the south coast of Peru".

Pioneering entrepreneurs

Some Peruvian entrepreneurs have already taken the initiative of planting caoba in the semiarid northern coastal region. Though they date back more than a decade, their efforts are little known to other forest operators in the country, making the documentation of their experience all the more urgent and valuable.

For example, Nils Perez, a forest manager who kindly shared his experiences with the ITTO project, planted 2.5 ha of caoba in Olmos District, Lambayeque Department, starting some 13 years ago. Perez germinated seed from native Amazon stands in a small nursery and transplanted the seedlings at 4–5 months.

The trees have done well, with the oldest specimens (among a total of some 1250) now standing more than 12 metres tall and with 25 cm dbh. Early borer attacks (by species other than *Hypsipyla grandella*) were observed but rapidly controlled. Mr Perez said at least three other families or businesses were growing caoba in the northern coastal region, in one case in an agroforestry system with cacao.

In the forester's view, the success of plantations near the northern coast shows the potential for the cultivation of caoba to support reforestation programmes, halt the loss of high-value forest species from the Amazon, and provide an alternative to experiments with maladapted exotic species. Moreover, plantations in coastal regions have the advantage of being closer to timber markets, wood processors and ports.

Researchers and students from several Peruvian universities regularly visit the existing caoba plantations, raising the prospect that the practices developed on the ground will become established in forestry education courses.

A promising plantation: A stand of 13-year-old big-leaf mahogany growing in the northern coastal region of Peru. *Photo: Nils Perez*

Relief for wild populations: a plantation with stands of big-leaf mahogany at different ages. *Photo: Nils Perez*

Approval was recently granted for another ITTO project[2] to evaluate in more depth the viability of cultivating this species in plantations in Peru's coastal regions.

Reforestation strategy

For the ITTO project focused on the arid southern coastal region, big-leaf mahogany was one of several forest species evaluated for use in reforestation, including in agroforestry systems along with agricultural crops.

Caoba seed from the northern coast was sown in a project nursery (with almost 100% germination), planted after 6 months, and sustained successfully with brackish water delivered twice a week via a drip-irrigation system. The salinity of the soil and water was controlled using abundant organic material, such as rice husk.

Other species that showed excellent results included native *Tara spinosa*, and exotic *Moringa oleifera*.

The two-year project, which was implemented by the Foundation for Agrarian Development in cooperation with the National Forest and Wildlife Service (SERFOR), demonstrated how smallholder farmers could be supported to become involved in forest landscape restoration activities.

Working closely with local communities and other stakeholders, the project identified priority areas of degraded and uncultivated land in the Department of Arequipa and the provinces of Camaná and Ocoña and prepared a strategy and action plan for restoration and rehabilitation efforts covering 100 000 ha.

Seeds of hope: Caoba seeds from trees growing in the semi-arid northern coastal region of Peru. *Photo: Nils Perez*

It is hoped that the strategy will be formally validated by SERFOR and an associated project proposal considered by the Peruvian government in the near future. Thus the chances of caoba being included in Peru's current and future sustainable forestry initiatives—and thus the prospects for the recovery of the embattled species in the wild—are becoming brighter.

Project outputs can be found by inserting the project code PD852/17 Rev.4 (F) into the ITTO project search function at www.itto.int/project_search.

Project PD852/17 Rev.4 (F) was made possible by funding from the United States of America. Project PD932/23 (F) is being implemented with funding from the Republic of Korea.

[2] PD 932/23 (F) "Assessment and dissemination of knowledge and experience for ex-situ conservation and plantation of caoba in northern coastal area, Peru".

Mainstreaming forensic timber identification in Indonesia

Research by an ITTO Fellow shows how the country can strengthen its capacity to counter illegal logging

by Achmad Solikhin[1]

(achmad.solikhin1993@gmail.com)

Law enforcement: A ranger patrolling Lore Lindu National Park on the Indonesian island of Sulawesi. *Photo: A. Windah*

Illegal logging accounts for an estimated 15–30% of global timber production, represents 50–90% of all logging in many tropical countries, and feeds an illegal timber trade worth USD 51–152 billion annually (Interpol, 2019). In Indonesia, illegal logging is believed to be a significant factor in the country's rapid deforestation. According to the World Resources Institute, the country lost 18% of its tree cover, or 29.4 million ha, between 2000 and 2022 (WRI, 2022).

To combat illegal logging and trade and improve the management of Indonesia's forests, the government developed a timber legality assurance system (known by its acronym SVLK) designed also to meet requirements from international markets for tropical timber that is certified as sustainable and legally sourced. Under SVLK, which has been in operation since 2013, timber can only be exported to the European Union and other major markets with so-called v-legal ("verified legal") documents proving its legality. However, issues related to these documents still arise, in particular because it is difficult for law enforcement officers in the field to confirm information provided under SVLK, such as the volume, genus, species, origin, age and history of a timber shipment. This makes it harder to detect illegal timber activities such as the falsification of logging permits, logging outside concessions and timber laundering.

This article presents policy recommendations and findings derived from an assessment of methods and technologies deployed and/or needed in Indonesia to identify illegal timber, including to provide evidence for legal proceedings. The wider assessment, which has been submitted to a scientific journal for publication (Solikhin et al., forthcoming), and thus also this policy-focused article, were enabled by an ITTO Fellowship granted in 2022, for which the author is extremely grateful.

Growing capacity

Information on capacities for forensic timber identification in Indonesia and how it could be further developed were gathered through a literature review and a survey of relevant stakeholders (details from the survey will be published in Solikhin et al. (forthcoming)).

The literature review included an online search for academic and technical studies published between 1976 and 2023 containing the words "wood identification", "forensic timber", "forensic wood" or "wood identification technologies". The results indicated that the subject is increasingly prominent on a global level (Figure 1a). Many of the studies related to or were published in Brazil, China, Japan and the United States of America (Figure 1b), However, over a more recent period (2009–2023), Indonesia stands out as the country most often concerned (Figures 2a and 2b).

The search identified a total of 19 studies related to Indonesia. The wood identification technologies mentioned in these studies included wood anatomy, synchrotron X-ray microtomography, convolutional neural networks (CNN)-based applications, smartphone apps, microscopic image databases, DNA analysis, computer vision, and mechanical analysis (Table 1). However, only one publication describes the use of wood identification technologies for providing forensic evidence admissible in a court of law.

The research indicates that Indonesia is well-equipped with technologies and laboratories that can support forensic timber identification. However, both technologies and laboratories are siloed in certain research and governmental institutions, which can create gaps in capacity. For instance, provincial laboratories are less well-equipped than national laboratories, though even at the national level, capabilities are not united in a single research facility. In addition, the number of experts in forensic timber identification in Indonesia is limited.

[1] This article is based on an unpublished policy brief prepared by the author along with Andrew Lowe, Arif Malik (both University of Adelaide, Adelaide, Australia), Evalina Herawati (Universitas Sumatera Utara, Indonesia), Herman Siruru (Universitas Pattimura, Indonesia), Renny Purnawati (Universitas Papua, Indonesia), Mahdi Mubarok (Institut Pertanian Indonesia), Jauhar Khabibi (Universitas Jambi, Indonesia), Eti Artiningsih Octaviani (Institut Teknologi Sumatera, Indonesia), Siti Halimah Larekeng (Universitas Hasanuddin, Indonesia), Chuck Cannon (Morton Arboretrum, United States of America) and Tegar Kurniawan (Universitas Islam Sultan Agung, Indonesia).

Figure 1: Number of studies relating to timber identification technologies in the period 1976–2023, (a) by year (globally) and (b) by country

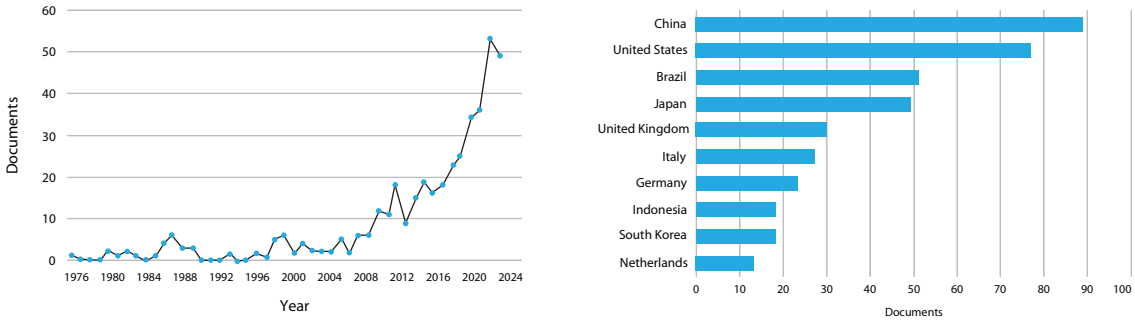


Figure 2: Number of studies relating to timber identification technologies in the period 2009–2023, (a) by year for Indonesia and (b) by country

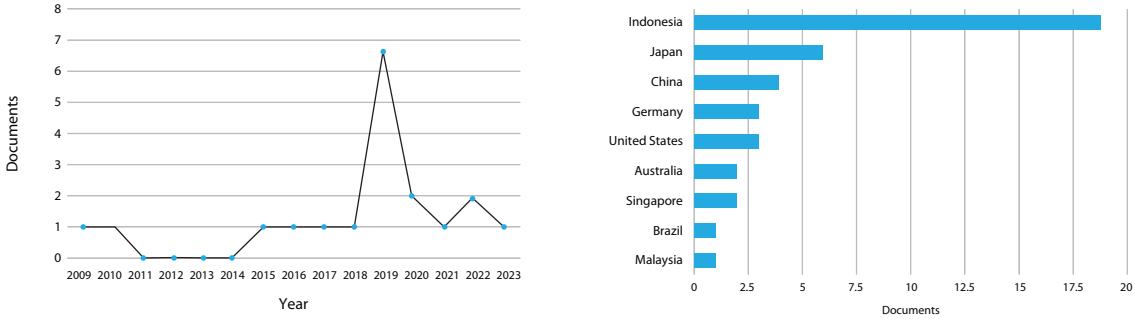
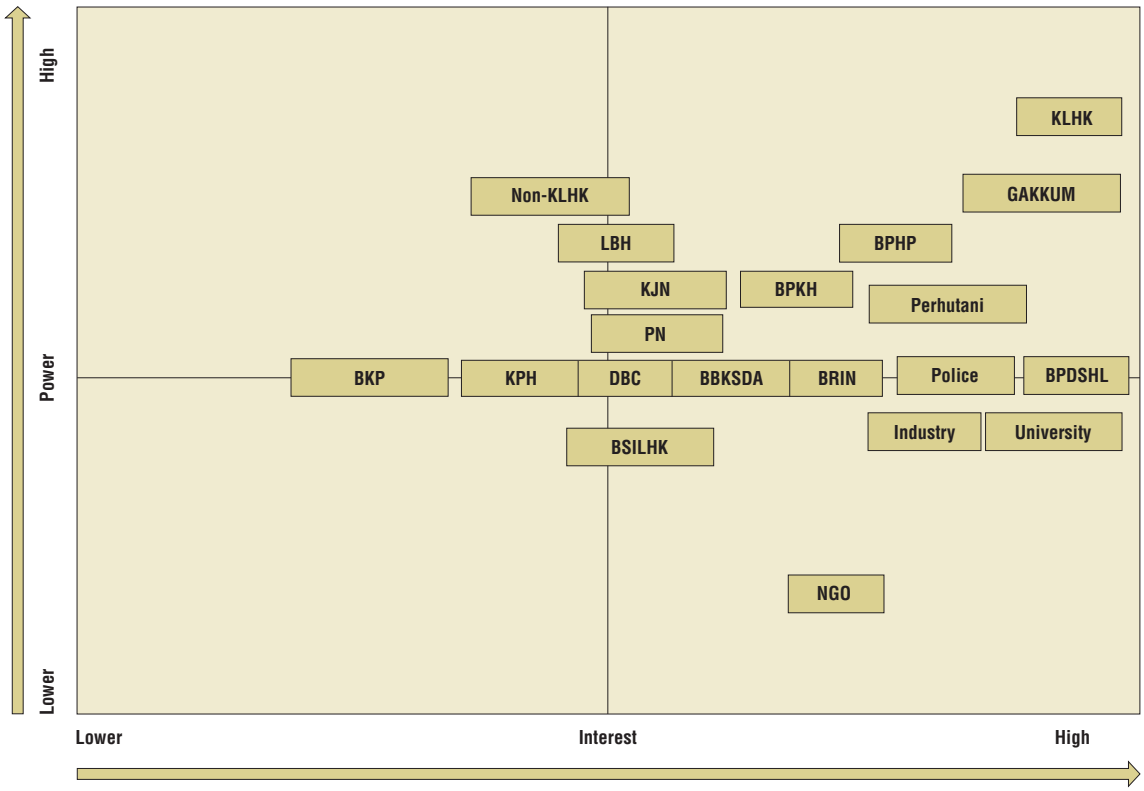


Table 1: Timber identification technologies and their characteristics

Characteristic	Forensic timber technologies									
	Digital technology	**Wood anatomy**	**Dendrochronology**	**Mass spectrometry**	**Near-infrared spectroscopy**	**Stable isotopes**	**Radiocarbon**	**DNA barcoding**	**Population genetics/ phylogeography**	**DNA fingerprinting**
Ability to determine key characteristics:[1,2] • Genus • Species • Geographic provenance • Individual • Age	 Yes Limited No No No	 Yes Limited Limited No No	 No No Yes Yes Yes	 Yes Yes Yes No No	 Yes Yes Yes No No	 No No Yes Yes Yes	 No No No No Yes	 Yes Yes Limited No No	 No Limited Yes No No	 No No No Yes No
Technical requirements	Smartphone with wood identification (machine vision) apps	Light microscope, electron microscope	Microscope and tree-ring measuring apps	Gas or liquid chromatography and MALDI-TOF mass spectrometers	Dispersive or Fourier-transform spectrometers	Isotope ratio mass spectrometry and stable isotope tracer	Radiocarbon accelerator mass spectrometry and liquid scintillation	Polymerase chain reaction, DNA sequencer and genomic DNA analysis	Polymerase chain reaction, DNA sequencer and genomic DNA analysis	Polymerase chain reaction, DNA sequencer and genomic DNA analysis
Wood properties assessed	Morphological (range of properties depends on database scope)	Morphological	Morphological (growth rings)	Chemical	Chemical	Chemical	Chemical	Biomolecular	Biomolecular	Biomolecular
Test time requirement[1]	Seconds to minutes	Minutes to days	Hours to days	Minutes to days	Minutes to days	Days	Days	Days	Days	Days
Test cost (per sample)[3]	Free (free apps downloadable from app stores)	< IDR 1 million	< IDR 1 million	< IDR 1 million	< IDR 1 million	> IDR 2 million	> IDR 5 million	> IDR 5 million	> IDR 5 million	> IDR 5 million
Availability of Indonesian standards for wood characterizations	N/A (AIKO wood ID app)	SNI 8491: 2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Availability of laboratories/technology	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: [1]Dormontt et al. (2015); [2]UNODC (2016); [3]cost in Indonesia (IDR 1 million = c. USD 65)

Figure 2: Key institutional stakeholders in the development of forensic timber identification in Indonesia



Note: Most of the stakeholder acronyms are expanded in the text below; other include: BBKSDA (Directorate General of Nature Conservation Agency), BKP (Directorate of Plant Protection, Quarantine and Storage, BPDSHL (Directorate General of Watershed and Protected Forest Management), BSILHK (Center for the Application of Environmental and Forestry Instrument Standards), KPH (Forest Management Unit) and NGO (Non-governmental organizations).

Stakeholder mapping

To inform potential efforts to strengthen Indonesia's forensic timber identification capacity, the study mapped institutional stakeholders according to their interest in expanding that capacity and their ability to make it happen. As shown in Figure 2, two groups of stakeholders that could be engaged in capacity-building efforts were identified: the "manage closely" group (in the first quadrant, with high interest and high power) and the "keep informed" group (in the second quadrant, with high interest but lower power).

The first group includes the Ministry of Environment and Forestry (KLHK), Directorate General of Environmental and Forestry Law Enforcement (GAKKUM), Production Forest Management Agency (BPHP), Forest Area Consolidation Centre (BPKH), Perhutani, State Attorney (KJN), District Court (PN), and Legal Aid Institute (LBH). All of these stakeholders have the power (including the necessary resources) to expand forensic timber identification capacities as well as an interest in doing so.

The "manage closely" group includes several institutions already involved in the application of forensic timber techniques, especially GAKKUM, BPHP, BPKH, Perhutani (state-owned forestry company), KJN, and PN. The Police and the Directorate General of Customs and Excise (DBC) of the Ministry of Finance could also play a role in the development of forensic timber capacities, given their interest and experience in gathering evidence in forestry crime cases (the police also maintain relevant forensic laboratories). However, their relative lack of influence makes them marginal candidates for the group of top priority stakeholders.

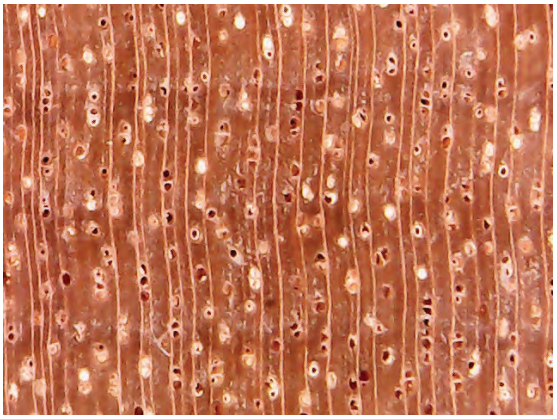
Stakeholders in the "keep informed" group include those with an academic interest in the field or in the provision of testing facilities. They include the National Research and Innovation Agency (BRIN), universities, and some laboratory operators.

Regulatory framework

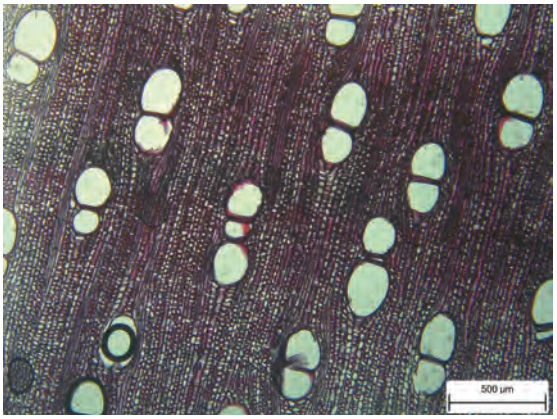
In Indonesia, it is well-noted that most requests to conduct forensic timber identification are made by GAKKUM KLHK, Police, DBC, and timber-based industries, and that research-based institutions (BRIN) and universities are the main providers of the service. The latter organizations have the accredited laboratories, appropriate technologies and technical expertise to forensically determine the characteristics of timber samples, including species, genus, geographical provenance, age and individual.

In addition, officers of BPHP, DBC, and BPKH are typically engaged to carry out rapid field assessments of wood legality using wood anatomy techniques. This may involve examining macroscopic structures and relying on a digital app or the expertise of the field officer to determine genus, species and wood volume.

In Indonesia, wood anatomy-based scientific evidence has been integrated with expert testimony and included in the legal documents prepared by law enforcement agencies investigating forestry crimes. Developing additional forensic technologies (Table 1) could further strengthen the evidence base in such cases.



Wood anatomy: Cross-section of *Flindersia pimenteliana* wood. *Photo: Muliyana Arifudin and Renny Purnawati, Universitas Papua*



Poacher's footprints? Microscopic wood identification of *Anthocephalus cadamba. Photo: Sulivia, Universitas Sumatera Utara*

Priorities for forensic timber

Indonesia is already applying forensic timber identification across the timber supply chain in the form of wood anatomy techniques. However, there are many ways in which these capacities could be expanded. Based on interviews with and questionnaires submitted by key stakeholders, the study identified priorities for the strengthening of legal and sustainable timber trade through the development of forensic timber identification, including:

- Encouraging the application of forensic timber identification in investigations and prosecutions involving illegal logging and illicit timber trade
- Supporting the development of laboratories, technologies, and related infrastructure
- Developing guidelines for forensic timber identification with reference to national and international standards and methods
- Developing and issuing regulations on forensic timber identification
- Providing relevant training, capacity-building, and education for law enforcement and non-law enforcement agencies
- Educating and enhancing the skills of relevant officers on forensic timber technology, research, and development
- Developing open-access, integrated databases for wood identification
- Securing reliable financing for forensic timber identification development

Interviewees viewed the first five priorities as particularly important for the development of forensic timber identification in the short term.

References

Bawono, B.T. and Mashdurohatun, A. 2011. Penegakan hukum pidana di bidang illegal logging bagi kelestarian lingkungan hidup dan upaya penanggulanganya. *Jurnal Hukum* Vol 26(2): 590-611.

Dormontt, E.E., Boner, M., Braun, B., Breulmann, G., Degen, B., Espinoza, E., Gardner, S., Guillery, P., Hermanson, J.C., Koch, G., Lee, S.L., Kanashiro, M., Rimbawanto, A., Thomas, D., Wiedenhoeft, A.C., Yin, Y., Zahnen, J. and Lowe, A.J. 2015. Forensic timber identification: It's time to integrate disciplines to combat illegal logging. *Biological Conservation* 191:790-798.

Interpol. 2019. *Global forestry enforcement: Strengthening law enforcement cooperation against forestry crime*. France: Interpol.

Obidzinski, K., Andrianto, A., Wijaya, C., Hernawan, D., Belle, C.W. 2007. The cross-border timber trade in Kalimantan: Will stopping timber smugglers help solve the illegal logging problem in Indonesia? *Governance Brief 1-4*, Bogor: CIFOR.

Solikhin, A., Lowe, A., Malik, A., Mubarok, M., Larengkeng, S.H., Purnawati, R., Octaviani, E.A., Herawati, E., Siruru, H., Cannon, C., Kurniawan, T. and Mangurai S.U.N.M. Forthcoming. How far is forensic timber's state and readiness level in Indonesia progressed to provide scientific evidence for addressing illegal logging? Submitted to *Environmental Development* ENVDEV-D-23-00584.

United Nations Office on Drugs and Crime (UNODC). 2016. *Best Practice Guide for Forensic Timber Identification*. New York: UNODC.

World Resources Institute (WRI). 2022. *Global Forest Watch: Indonesia*. Retrieved from www.globalforestwatch.org/dashboards/country/IDN/

Documenting fire prevention in Machu Picchu: Fires are affecting an increasing area of forest worldwide, and the Inca citadel of Machu Picchu is not immune. *Photo: G. Delgado*

ITTO support yields award-winning film on Peru forest fires

by ITTO Fellow Talía Lostaunau

In late 2021, I received the news that I had been awarded an ITTO Fellowship. My excitement was great. I had previously received this fellowship in 2019 to study journalism at the University of California, Berkeley, and the impact it had on my professional development was tremendous. It allowed me to strengthen my skills and publish articles in renowned media outlets. In 2021, the selection committee renewed its faith in my work by granting the fellowship to produce a short documentary on forest fires in Peru—a problem that worsens with each passing year.

The opportunity was extraordinary: a chance to collaborate with a remarkably skilled director and a top-notch director of photography. This, coupled with unwavering support from organizations immersed in the subject, such as the National Forest and Wildlife Service of Peru (SERFOR) and the Peruvian National Service of Natural Protected Areas (SERNANP), paved the way for an all-encompassing documentary. It's more than an informative piece; it's a powerful catalyst, kindling empathy for these precious ecosystems and the valiant firefighters and park rangers committed to their preservation.

The Guardians of Machu Picchu launched on ITTO's website in May 2023. Since then, the documentary has been part of the official selection of the Steve Aronson International Film Festival, the Inkafest Mountain Film Festival, and received an award at the Festival de Cine de Ancash in the people's choice category.

For me and the team, it is an honour to be able to showcase *The Guardians of Machu Picchu* to broader audiences and to help more people learn about forest fires. This endeavour assumes even greater significance in 2023, a year marred by a surging global wildfire crisis. We're committed to tirelessly championing the film, steering it towards non-scientific audiences to awaken hearts and minds to this pressing cause. The journey continues, and the flame of awareness burns brighter than ever.

On alert: Justiniani Candia, a Peruvian forest firefighter featured in the film produced thanks to an ITTO fellowship. *Photo: G. Delgado*

Read more at: www.itto.int/news/2023/05/11/documentary_released_on_fire_prevention_in_machu_picchu_ahead_of_global_wildland_fire_conference/

Watch the film at: www.youtube.com/watch?v=Z9mprRMp1Z0

China's economy dims outlook for tropical timber trade

Falling prices and a real-estate crisis in the world's second-largest economy are weighing on imports of timber, especially hardwood logs

by Tan Xiufeng[1] and Michael Adams[2]

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Facing sluggish demand: A store selling wooden furniture in Beijing, China. *Photo: Tan Xiufeng*

As households around the world grapple with rising living costs, China is facing the opposite problem: falling prices.[3] In July, the Chinese economy dipped into deflation for the first time in two years. Consumer prices were flat for most of the first half of 2023 in contrast to the global trend of surging prices for everything from energy to food. Falling prices over an extended period can see consumers reduce spending and companies cut back on production.

China's stagnant economy is a concern for suppliers of raw materials, including timber. Weak demand at home and abroad has prompted some Chinese wood product manufacturers to cut back production and, because China depends on imported wood raw materials, this has negatively impacted log imports, especially hardwood logs, though imports of sawnwood remain resilient.

According to China Customs, the country imported 20.31 million m^3 of logs worth USD 3.566 billion in the first half of 2023, down 9% in volume and 22% in value compared to the same period of 2022 (Table 1). The average price for imported logs was USD 176 (CIF[4]) per m^3, down 10% from the year-earlier period.

Softwood log imports down

Imports of softwood logs into China in the first half of 2023 fell 2% to 14.87 million m^3, accounting for 73% of total log imports, with the average price declining 10% to USD 145 (CIF) per m^3 since the same period of 2022.

[3] www.investing.com/analysis/chinas-economy-slips-into-deflation-threatening-postcovid-recovery-200640862

[4] CIF indicates prices including the cost of insurance and freight.

Table 1: China's log imports, first half of 2023

Product	Volume (million m^3)	Change (year-on-year)
All logs	20.31	-9%
Softwood logs	14.87	-2%
All hardwood logs	5.43	-25%
Tropical logs	2.95	-28%

Source: China Customs

China's log imports from Russia plunged 32% in the first half of 2023 to less than 1 million m^3 (Table 2), reflecting how the timber trade between the two countries has been hit by the coronavirus pandemic and the war in Ukraine, and the impact of higher Russian tax on log exports. Imports from Germany and Papua New Guinea also fell, though shipments from New Zealand, Poland and Japan rose.

Hardwood logs hit hard

Hardwood log imports into China plunged 25% to 5.43 million m^3 in the first half of 2023, accounting for 27% of total log imports. The average price fell 8% to USD 260 (CIF) per m^3.

Among hardwood log imports were 2.95 million m^3 of tropical logs valued at USD 761 million (CIF)—a drop of 28% in volume and 35% in value from the year-earlier period. Tropical logs accounted for just 15% of total log imports, down 2 percentage points. The average price for imported tropical logs was USD 258 (CIF) per m^3, down 9% from the same period of 2022.

Table 2: Major log suppliers, first half of 2023

Supplier	Volume (million m^3)	Change (Year-on-year)
Total	**20.31**	**-9%**
New Zealand	8.79	8%
Germany	2.33	-27%
Papua New Guinea	1.24	-7%
United States of America	1.14	1%
Russian Federation	0.96	-32%
Solomon Islands	0.77	1%
Poland	0.67	312%
Japan	0.64	17%
Canada	0.52	-6%
France	0.51	-26%

Source: China Customs

China imported tropical logs—typically used to manufacturer plywood core veneers—mainly from Papua New Guinea (42%), Solomon Islands (26%), the Republic of Congo (9%) and Cameroon (7%). Lower imports from Papua New Guinea drove the overall decline (Table 3). Imports from several African countries also fell, though those from the Republic of the Congo moved higher.

Table 3: Major tropical hardwood log suppliers, first half 2023

Supplier	Volume (thousand m^3)	Change (Year-on-year)
Total	**2948**	**-28%**
Papua New Guinea	1239	-7%
Solomon Islands	773	1%
Republic of the Congo	253	8%
Cameroon	211	-7%
Suriname	69	-28%
Democratic Republic of the Congo	66	-50%
Mozambique	49	-68%
Honduras	44	5,000+%
Equatorial Guinea	38	-84%
Central African Republic	34	-23%

Source: China Customs

Sawnwood resilience

China's sawnwood imports in the first half of 2023 totalled 14.31 million m^3 and were valued at USD 3.659 billion, up 10% on the year-earlier period in volume but down 5% in value (Table 4). Of total sawnwood imports, sawn softwood imports jumped 22% to 9.47 million m^3 (66% of the total), while sawn hardwood imports grew only 2% to 4.84 million m^3.

Among sawn hardwood imports, tropical sawn hardwood accounted for 3.26 million m^3 valued at USD 948 million, up 3% in volume but down 1% in value.

Volumes down: Imported logs at Zhangjiagang port, China. *Photo: Tan Xiufeng*

Table 4: Sawnwood imports, first half 2023

Product	Volume (million m^3)	Change (Year-on-year)
All sawnwood	14.31	10%
Sawn softwood	9.47	22%
All sawn hardwood	4.84	2%
Tropical sawn hardwood	3.26	3%

Source: China Customs

Total sawnwood imports rose mainly because of increased volumes from top suppliers Russia and Thailand. Sawnwood imports from Sweden, Germany and Belarus also surged, though the volume from Gabon fell. The overall increase reflects also a shift in Chinese timber imports from logs to sawnwood, due in part to log export bans in some countries. Chinese government policies to support the real estate market and promote domestic consumption also likely played a role.

Thailand has been the largest supplier of tropical sawn hardwood (predominantly rubberwood) to China for many years. In the first half of 2023, China's tropical sawnwood imports from Thailand rose 3% in volume to 2.07 million m^3 (64% of total tropical sawnwood imports), and 1% in value to US$504 million (Table 5). The Philippines and Gabon were the second- and third-largest suppliers, accounting for 11% and 8% of total tropical sawnwood imports, respectively. Shipments from the Philippines (as well as Myanmar and Cameroon) rose in the first half of 2023, while those from Gabon (as well as Indonesia and Malaysia) fell.

Plywood struggle

A large share of the logs imported into China is consumed by plywood manufacturers and the drop in imports is reflected in lower plywood production and export volumes. In the first half of 2023, China's plywood exports were 5.13 million m^3 valued at USD 2.368 billion, down 9% in volume and 20% in value over the same period of 2022 (Table 6). The decline mirrored a 15% fall in the number of plywood manufacturers in China and a 6% contraction in their production capacity.

Quality control: Checking finished woodflooring at a factory in Huzhou, China. *Photo: R. Carrillo*

Among key markets for China's plywood, there was a 7% fall in exports to the Philippines and an 18% drop in exports to the United Kingdom. The United States of America was until recently the main market for Chinese plywood, but in the first half of 2023 there was an almost 40% decline in exports on that route.

Furniture falling

A high proportion of imported sawnwood is used for the manufacture of furniture, including for export. The United States of America remains the largest overseas market for China's wooden furniture, despite a 14% decline in export value in the first half of 2023 to USD 3.322 billion (Table 7).

Falling exports to Japan, the United Kingdom, Australia and the Republic of Korea helped drag total exports in the period down 12% to USD 11.509 billion.

Domestic revival?

To stimulate the economy, the Chinese government appears to have embraced a strategy based on building a strong demand at home as well as abroad. The aim is to make the economy less vulnerable to external shocks. But the crisis in construction and real estate, which account for 20% of gross domestic product and strongly influence demand for timber, is proving tough to address. Home sales in China continue to fall despite efforts by the government to reverse

Table 5: Major tropical sawnwood suppliers, first half of 2023

Supplier	Volume (thousand m^3)	Change (Year-on-year)
Total	**3261**	**3%**
Thailand	2071	3%
Philippines	363	14%
Gabon	258	-14%
Myanmar	133	124%
Cameroon	69	8%
Viet Nam	63	98%
Indonesia	50	-5%
Malaysia	43	-36%
Papua New Guinea	34	46%
Lao People's Democratic Republic	32	-14%

Source: China Customs

Table 6: Major export markets for Chinese plywood, first half 2023

Supplier	Volume (thousand m^3)	Change (Year-on-year)
Total	**5133**	**-9%**
Philippines	445	-7%
United Kingdom	344	-18%
Nigeria	291	72%
United Arab Emirates	276	11%
Japan	267	-27%
Saudi Arabia	210	-13%
Mexico	193	3%
Australia	179	-10%
Israel	169	15%
United States of America	143	-39%

Source: China Customs

Domestic revival? A furniture shop in Beijing. China is a major exporter of wooden furniture. *Photo: Tan Xifueng*

Table 7: Major export markets for wooden furniture exports, first half 2023

Market	Value (million USD)	Change (Year-on-year)
Total	**11 509**	**-12%**
United States of America	3 322	-14%
Japan	710	-12%
United Kingdom	671	-2%
Australia	665	-19%
Republic of Korea	654	-7%
Canada	364	-20%
Saudi Arabia	311	-3%
France	287	-11%
Germany	287	-11%
Malaysia	277	-31%
Philippines	221	-8%
Thailand	210	18%

Source: China Customs

the trend. The measures proposed include easing restrictions on second-home purchases and reducing downpayments for first-time homebuyers.

Still, there are also some positive signs. The International Monetary Fund still expects the Chinese economy to expand by 5.2% this year;[5] and the Global Timber Index (GTI) report for July 2023 described signs of recovery in the timber and wood products market in China.[6] The number of new orders placed with Chinese enterprises represented in the GTI increased compared to the previous month, though orders from overseas fell slightly, lifting the overall GTI-China index by 4.8 percentage points to 53%.

[5] www.imf.org/en/Publications/WEO/Issues/2023/07/10/world-economic-outlook-update-july-2023
[6] www.itto.int/gti/

Tropical and topical

Area of tropical forest the size of Switzerland lost in 2022

Deforestation, logging and wildfires reportedly cost the planet an area of tropical rainforest the size of Switzerland or the Netherlands in 2022, euronews reported.

Global Forest Watch, the deforestation monitoring platform of the World Resources Institute, recorded the destruction of more than 4.1 million ha of primary tropical forest in the year. An area the size of a football pitch was destroyed every five seconds.

The hardest-hit countries included Brazil (43% of global losses), the Democratic Republic of the Congo (13 per cent) and Bolivia (9 per cent). The lost primary tropical forests released about 2.7 billion tonnes of CO_2, equivalent to the annual emissions of India, the report said.

Read the full story: www.euronews.com/green/2023/06/27/world-forests-continue-to-shrink-despite-cop26-pledge-report-says

Leveraging cacao agroforestry to protect Ecuadorian rainforest

A programme in Ecuador is leveraging cacao agroforestry to help protect and restore part of the threatened Jama-Coaque Reserve, Mongabay reported.

Run by a US and Ecuadorian nonprofit group, the programme supports farmers in Ecuador's Pacific Forest to transition to shade-grown cacao using native tree species and helps them access premium markets for their produce.

Through land purchases, agroforestry, and reforestation, the organization also aims to create a 43-kilometre wildlife corridor connecting the Jama-Coaque Reserve with Cerro Pata de Pájaro. These are two of the largest fragments of the forest, of which only an estimated 51 000 ha, or 2.2%, remains intact.

Read the full story: https://news.mongabay.com/2023/09/can-agroforestry-chocolate-help-save-the-worlds-most-endangered-rainforest

Leaves in tropical rainforests may get too hot for photosynthesis

Some leaves in tropical forests may be getting too hot to photosynthesize as climate change progresses, posing a potential threat to their stocks of carbon and biodiversity, a new study has found.

As reported by CNN, scientists using data from sensors on the International Space Station and experiments in forest canopies found that 0.01% of leaves were passing the temperature threshold of about 46.7ºC.

While low, this percentage is poised to increase with global warming, according to the study published in Nature in August 2023.

Read the full story: https://edition.cnn.com/2023/08/23/world/tropical-forest-heat-photosynthesis-climate-scn-intl/index.html

Quirky palm species found by ITTO scientist hits the headlines

An unusual species of palm recently heralded as new to science was discovered by an ITTO scientist in Sarawak, Malaysia some 15 years ago.

A research paper published in June identified the palm as *Pinanga subterranea* (Arecaceae) and said it was the first species of the palm family recorded to flower and fruit almost exclusively underground, triggering numerous media reports.

ITTO project manager Paul Chai, who co-authored the paper, said he first came across the palm during a field trip in the Lanjak Entimau Wildlife Sanctuary in 1998, but his photographs of the plant were lost in a flood. The palm has long been known—and used—by local people.

Read the full story: www.itto.int/news/2023/07/13/new_palm_species_unearthed_itto_project_scientist_recalls_first_encounter_with_bizarre_species

New approach to protect carbon and communities from forest fires

Researchers have combined spatial data on forest fire risk with maps of vulnerable human communities to identify priority areas for wildfire mitigation efforts, Science Daily reported.

The approach, which was applied to the western United States of America, can inform the planning of interventions that reduce the loss of forest carbon stores, and thus help alleviate climate change, while also protecting people.

Land management agencies could use the approach to decide where to take proactive measures—such as forest thinning, prescribed fire, and cultural burning—also to protect assets such as water supplies, recreation areas, and wildlife habitat.

Read the full story: www.sciencedaily.com/releases/2023/09/230906122108.htm

Brazil expels non-indigenous people from native territories in the Amazon

Brazil's government has begun removing thousands of non-indigenous people from two native territories in the Amazon, the Associated Press reported, in a move that could help reduce deforestation.

Authorities aim to return the the Apyterewa and Trincheira Bacaja lands in Para state to the original peoples and halt damage to the forest, the report said. About 1600 families were living there illegally. The Apyterewa territory had the most deforestation of any Indigenous land in Brazil for four years running.

President Luiz Inácio Lula da Silva has rebuilt environmental protection agencies and created eight protected areas for Indigenous people. His government has also expelled thousands of gold miners from the Yanomami Indigenous territory in the northern state of Roraima.

Read the full story: https://apnews.com/article/brazil-indigenous-territories-expulsion-lands-amazon-removal-8f4ee1bd8c1b87a90303182c6547500a

Recent editions

ITTO 2023. *Biennial Review and Assessment of the World Timber Situation 2021–2022*. International Tropical Timber Organization (ITTO), Yokohama, Japan.

ISBN: 978-4-86507-096-5

Available at: www.itto.int/annual_review

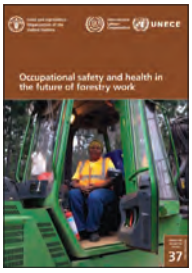
A major new analysis of global timber sector trends has found that exports by ITTO producer countries of secondary processed wood products have soared, reaching a value of USD 36.5 billion in 2022, up by nearly 40% compared with 2020. A large part of this trade (USD 12 billion) comprised wooden furniture exported from Viet Nam to the United States of America. ITTO's review series examines the production, trade and prices of primary wood products (industrial roundwood, sawnwood, veneer and plywood); trade and prices for secondary processed wood products; major traded tropical wood species; and directions of trade for primary tropical wood products. Data from the review series are included in ITTO's online statistical database[1] spanning 1990–2022, a formidable tool for analyzing the evolution of, and long-term trends in, the trade of tropical timber and primary tropical timber products, as well as important shifts in timber production and further processing. The 2021–2022 review will be released in French and Spanish in the coming months.

ITTO 2023. *Annual report 2022*. International Tropical Timber Organization (ITTO), Yokohama, Japan.

ISBN 978-4-86507-092-7

Available at: www.itto.int/annual_report

In 2022, ITTO brought new energy to its efforts to alert the world to the importance of sustainable tropical forest management and legal and sustainable wood trade in tackling global challenges. As illustrated in its annual report, the Organization's catalytic projects continued to showcase the incredible potential of sustainable forestry for transforming communities, while its policy work had global impacts. ITTO worked with collaborating institutions on topics as diverse as forest education, the trade in endangered species, and production and trade data, showing its expertise, versatility and reach.



FAO, ILO and United Nations. 2023. *Occupational safety and health in the future of forestry work*. Forestry Working Paper, No. 37. Food and Agriculture Organization of the United Nations (FAO), Rome.

ISBN: 978-92-5-137966-0

Available at: https://unece.org/forests/publications/occupational-safety-and-health-future-forestry-work

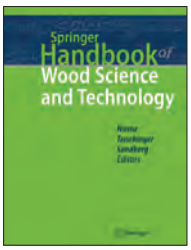
Climate change, demographic transitions, technological development and innovation are megatrends affecting forestry work. As the conditions of forestry work change, so does the nature of the work-related risks. Despite efforts and improvements made over the past few decades, forests continue to be one of the most hazardous industrial workplaces, with those working in forests exposed to considerable occupational safety and health risks as well as a high incidence of occupational accidents and work-related diseases. This report identifies trends and opportunities as well as challenges to promote safe and healthy working conditions in the forest sector. It contributes to understanding the importance of decent and sustainable work in forestry, with the objective of informing the design and implementation of policies and training programmes to advance a just transition in forestry following the framework of the 2030 Agenda for Sustainable Development, particularly Sustainable Development Goal 8 on decent work and economic growth and Goal 15 on life on land.

[1] www.itto.int/biennal_review/

FAO. 2023. *Monitoring gender equality and social inclusion in forest and landscape restoration programs*. Food and Agriculture Organization of the United Nations (FAO), Rome.

Available at: www.fao.org/documents/card/en/c/cc7649en%20/

Integrating gender equality and social inclusion (GESI) in forest and landscape restoration projects and programmes helps to ensure access to a diversity of knowledge; promotes the efficiency and effectiveness of these efforts; and incentivizes both women and men to contribute to restoration. This brochure is a tool to guide monitoring of GESI in forest and landscape restoration projects and programmes, relevant for both national and subnational efforts. It includes a checklist to evaluate a programme's attention to GESI and guidance on how to define specific indicators to track progress.



Niemz, P., Teischinger, A. and Sandberg, D. 2023. *Springer Handbook of Wood Science and Technology*. Springer, Cham, Switzerland.

ISBN 978-3-030-81314-7

Available at: https://link.springer.com/book/10.1007/978-3-030-81315-4

The State of the World's Forests 2022 explores the potential of three pathways for achieving green recovery and tackling planetary crises including climate change and biodiversity loss: halting deforestation and maintaining forests; restoring degraded lands and expanding agroforestry; and sustainably using forests and building green value chains. It argues that the balanced, simultaneous pursuit of these pathways can generate sustainable economic and social benefits, help sustainably meet increasing global demand for materials, and address environmental challenges. The report presents evidence on the feasibility and value of the pathways and outlines initial steps that could be taken to pursue them.

Meetings

ITTO meetings

19–21 March 2024
ITTO–FAO Meso-American workshop on Forest Products Statistics (by invitation only)
Zapopan, Mexico
The workshop aims to assist member countries in the region in strengthening their ability to collect, analyze and report forest product statistics.
More: www.itto.int/events

1–6 December 2024
60th Session of the International Tropical Timber Council and Sessions of the Associated Committees
Yokohama, Japan
The International Tropical Timber Council is ITTO's governing body. It meets once a year to discuss a wide-ranging agenda aimed at promoting sustainable tropical forest management and the trade of sustainably produced tropical timber. Council sessions are open to official delegates and accredited observers.
More: www.itto.int/events

Other meetings

15–19 January 2024
International Conference "Role and Fate of Forest Ecosystems in a Changing World" and 31st Biennial Conference of IUFRO Research Group 8.04 on "Air pollution and climate change"
Bangkok, Thailand
More: www.iufro-bangkok2024.com

26 February–1 March 2024
Sixth session of the UN Environment Assembly (UNEA 6)
Nairobi, Kenya
More: www.unep.org/environmentassembly/unea6?%2Funea-6=

10–12 April 2024
International Forest Policy Meeting 5 (IFPM5)
Helsinki, Finland
More: www.helsinki.fi/en/conferences/international-forest-policy-meeting-5

25–26 April 2024
Trouble in the Woods 2024 Conference
Sheffield, United Kingdom
More: https://ianswalkonthewildside.wordpress.com/2023/08/30/trouble-in-the-woods-2024-conference/

6–10 May 2024
19th session of the UN Forum on Forests (UNFF19)
New York, United States of America
More: www.un.org/esa/forests/events/19th-session-of-the-un-forum-on-forests-unff19/index.html

13–16 May 2024
Short Rotation Woody Crops International Conference: "The Future is Green: Integrating Short Rotation Woody Crops, Agroforestry, and Ecosystem Services for Sustainable, Productive Landscapes"
Columbia (Missouri), United States of America
More: www.iufro.org/fileadmin/material/science/divisions/div1/10300/columbia-srwc-24-save-the-date.pdf

23–29 June 2024
IUFRO World Congress 2024: "Forests and Society Towards 2050"
Stockholm, Sweden
More: https://iufro2024.com/

22–26 July 2024
27th Session of the FAO Committee on Forestry (COFO 27)
Rome, Italy
More: www.un.org/esa/forests/events/27th-session-of-the-fao-committee-on-forestry-cofo-27/index.html

21–23 August 2024
IUFRO Division 7 Joint Meeting: "Theory and Practice to Address Defoliating Insects, Invasive Pests and Biological Control of Insects and Pathogens in Forests"
Tokyo, Japan
More: www.iufro2024tokyodiv7.com/

8–13 September 2024
11th Meeting of the IUFRO Working Party 7.02.09: "Phytophthora in Forests and Natural Ecosystems"
Paihia, New Zealand
More: www.scienceevents.co.nz/iufro2024

9–10 September 2024
International Conference on Architecture and Bio-based Building Materials
Tokyo, Japan
More: https://waset.org/architecture-and-bio-based-building-materials-conference-in-september-2024-in-tokyo

10–14 September 2024
10th Pacific Regional Wood Anatomy Conference (10th PRWAC)
Hokkaido, Japan
More: www.iawa-website.org/en/Meeting/Future_Meetings/article_225.shtml

17–21 September 2024
23rd International Nondestructive Testing and Evaluation of Wood Symposium
São Paulo, Brazil
More: www.ndtesymposium.org/

21 October 2024–1 November 2024
Sixteenth meeting of the Conference of the Parties (COP16) to the Convention on Biological Diversity
Venue to be determined
More: www.cbd.int/process/

17–21 March 2025
IUFRO Unit 1.01.04: "Forest Establishment and Early Growth Dynamics"
Rotorua, New Zealand
More: www.iufro.org/fileadmin/material/science/divisions/div1/10104/rotorua25-1st-announcement.pdf

Note that all meetings are subject to change or cancellation. Please check the contact addresses for the latest information.

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

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