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

Earning more from forests

Many people make a good living by harvesting and processing timber and non-timber forest products, but a great many more are poor. A key task for forest policymakers, foresters and extension agencies is to enable forest-dwelling people to earn more from forests.

This edition of the *TFU* looks at the role of forests in livelihoods. Ewald Rametsteiner and Adrian Whiteman (p. 3) present an article summarizing FAO's *State of the World's Forests 2014*, which surveyed the socioeconomic benefits provided by forests. They estimate that the total income earned from forests worldwide was US$730 billion in 2011, more than 80% of which was due to the

Inside: socioeconomic benefits, ITTO projects and livelihoods, reduced-impact logging in Gabon ...

ITTO

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Images: Workers put the finishing touches on a bamboo chair as part of value-added training in Peru (cover); two project beneficiaries pose with a newly planted bamboo seedling (above). *Photos: J. Takahashi*

... Editorial continued

wood-based forest sector. While this is substantial, it constitutes only about 1% of the total global economy. The lion's share of socioeconomic benefits from forests is not monetized because it is derived from the direct consumption of forest goods and services—billions of people use forest products and environmental services to directly meet their needs for food, energy and shelter. Better policies could increase the benefits derived from forests, say Rametsteiner and Whiteman: providing people with greater access to forests and markets and improving the enabling environment for producer organizations, for example, are powerful ways of increasing benefits.

Other articles in this edition present ITTO projects[1] that have been working at the local level to help communities improve their forest-based livelihoods. Herry Subagiadi and Harianto Arifin (p. 7) report on a project to promote the conservation and sustainable use of biodiversity and environmental services in the Cibodas Biosphere Reserve in Java, Indonesia, by strengthening forest law enforcement and governance. Among other things, the project helped developed a cadre of local trainers and extension workers with knowledge of the Reserve and its management; the aim was to build the capacity of communities to pursue sustainable economic development opportunities, such as those based on ecotourism, crafts manufacture, renewable energy and organic farming.

Another ITTO project, described by Josefina Takahashi (p. 10), aimed to assist local people in the Peruvian Amazon in realizing the huge commercial potential of bamboo. Bamboo forests in the region are under threat from degradation and conversion, but improvements in the quality of bamboo culms as a result of project interventions have increased prices in the area by 400% or more. Bamboo production is now a more profitable land use in the project's areas of influence than any other annual or biannual agricultural crop.

An article by Cécile Ndjebet and Patrice Ngokoy (p. 13) describes the threats faced by mangrove forests in the Cameroon Estuary and the activities of an ITTO project to address those threats. The project helped develop a master plan for the management of the mangrove forests and also worked with local people to develop new livelihood strategies. The project worked with more than 900 people in "common interest groups", who were able to increase their income by up to 40%.

An article by Arsenio Ella and Emmanuel Domingo (p. 16) describes an ITTO project in the Philippines that taught new methods for making use of non-timber forest products to three communities through seminars, hands-on training and work experience. Those communities are now better equipped to boost their livelihoods while managing the forest resource sustainably.

Finally, and on a different tack, an article by Vincent Medjibe (p. 18) presents the results of a study in Gabon on the impacts of three logging regimes. Timber harvesting is an important source of livelihoods in Gabon, employing more than one-quarter of the country's workforce, but conventional logging is highly destructive of the forest. Medjibe concludes that reduced-impact logging, combined with silvicultural operations to stimulate the regeneration of okoumé, is required to ensure the longevity of the timber industry and the livelihoods associated with it.

People are most likely to manage forests well when it benefits them to do so. Ensuring such benefits is perhaps the ultimate challenge for forest policymakers: it might mean reforming forest tenure, supporting forest producer organizations and clearing away the hurdles to value-added processing and fair market access, among other things. Well-managed forests have tremendous potential to contribute to people's livelihoods; through its project program, ITTO is working with its partners to demonstrate how. The task now is to scale up such efforts.

Ramón Carrillo
Editor

[1] ITTO now has a searchable online database of its completed, operational and pending projects. See page 26 for details.

The socioeconomic benefits of forests

Forests play a major role in the livelihoods of billions of people, and there is potential to scale up their contributions to global sustainable development

by Ewald Rametsteiner and Adrian Whiteman

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Social and economic: Women sell fruit and vegetables in the shade of trees in Kigoma, United Republic of Tanzania. *Photo: S. Maina/FAO*

In most regions of the world, forests, trees on farms, and agroforestry systems play important roles in the livelihoods of rural people by providing employment, energy, nutritious foods and a wide range of goods and environmental services. Well-managed forests have tremendous potential to contribute to sustainable development. What is lacking is empirical data that provides clear evidence of this.

FAO publishes a report on the state of the world's forests every two years, each edition focusing on a specific topic. Last June FAO released *State of the World's Forests 2014* (known as SOFO 2014), which presented data on the socioeconomic role of forests and reviewed policies for enhancing that role. This article summarizes some of the report's findings.

Measuring the socioeconomic benefits

Information is collected routinely on forests, trees and related management aspects. Measuring the social or socioeconomic benefits derived from forests is much more challenging, however, because of the lack of systematic data collection and the consequent scarcity of hard evidence to demonstrate societal benefits. Some assessments of the socioeconomic benefits of forests exist at the project or local level, and some data are collected at the national level, such as the contribution of forests to gross domestic product and employment, and some of these are compiled at the global or regional levels through, for example, FAO's Global Forest Resources Assessment and the regional criteria and indicators processes (including ITTO's). Overall, however, the collection and analysis of information on socioeconomic benefits is weak and needs to be improved if the contributions of forests to society are to be fully recognized.

A first step in improving data on the socioeconomic benefits from forests is to define the term. We propose the following definition:

> Socioeconomic benefits from forests are the basic human needs and improvements in quality of life (higher-order needs) that are satisfied by the consumption of goods and services from forests and trees or are supported indirectly by income and employment in the forest sector.

Note that the following analysis does not include many of the direct and indirect environmental and cultural services and existence benefits that forests are known to provide.

The multiple benefits provided by forests

Income from forestry and forest-related activities

The table on page 5 summarizes the data compiled in SOFO 2014 on the socioeconomic benefits of forests. Among other things, it shows that, globally, the value added in the wood-based forest sector amounted to just over US$600 billion in 2011, which was 0.9% of the global economy. The non-wood forest product sector generated a further US$88 billion in income; the informal production of woodfuel and forest products used for house construction generated US$33 billion; and there were other, smaller contributions. The total income generated by forests in 2011 was estimated at about US$730 billion.

Employment

The formal forest sector employs an estimated 13.2 million people worldwide, and at least another 41 million are employed in the informal sector. About 29 million people own forests.

An estimated 840 million people—12% of the world's population—collect woodfuel for their own use. This is not strictly employment, and many of those involved in this activity are women and children, who are usually unpaid for their woodfuel collection work.

On the job: Workers in a plywood factory in China. *Photo: A. Lebedys/FAO*

Consumption benefits

Notwithstanding the considerable contributions of forests to the global economy, employment and personal wealth, the lion's share of socioeconomic benefits from forests is derived from the consumption of forest goods and services. Billions of people use forest outputs to directly meet their needs for food, energy and shelter.

Wood energy is often the only energy source in rural areas of less-developed countries and is particularly important for poor people. It accounts for 27% of total primary energy supply in Africa, 13% in Latin America and the Caribbean, and 5% in Asia and Oceania. Wood energy is also increasingly used in developed countries as a means of reducing dependence on fossil fuels: about 90 million people in Europe and North America now use wood energy as their main source of domestic heating.

Forest products make a significant contribution to the shelter of at least 1.3 billion people, or 18% of the world's population. Forest products are used in the construction of peoples' homes in almost all parts of the world. The recorded number of people living in homes where forest products are the main materials used for walls, roofs or floors is about 1 billion in Asia and Oceania and 150 million in Africa. This estimate is based on only partial information, and the true number could be much higher.

A major contribution of forests to food security and health is the provision of woodfuel for cooking and the sterilization of water. It is estimated that about 2.4 billion people cook with woodfuel, of whom an estimated 764 million people also boil their water with wood. On the downside, an estimated 1.7 million people die each year as a result of indoor air pollution caused by woodfuel use (usually where woodstoves are inefficient, and there is considerable scope to reduce the number of such deaths). The collection of edible non-wood forest products also supports food security and provides essential nutrients for many millions of people.

Further work is needed to evaluate and develop the socioeconomic benefits of forests for specific groups, including women, indigenous people and the poor.

Long haul: A man transports fuelwood along a dusty road in Niger. Woodfuel is a major source of energy for more than 2 billion people worldwide. *Photo: G. Napolitano/FAO*

Policy measures to enhance socioeconomic benefits

SOFO 2014 reviewed and analyzed the policies and measures put in place by countries since 2007 to enhance the socioeconomic benefits of forests. The analysis found that virtually all countries with significant forest resources have national forest programs or similar regimes of policies and programs that address critical forest issues. Countries also usually have policies and instruments that address socioeconomic benefits. The number of measures introduced by countries to promote sustainable forest management (SFM) since 2007 is impressive.

There have been substantive shifts in the last few decades in certain areas of forest policy, such as the adoption of a broader concept of SFM, more emphasis on participation in policy processes and forest management, and more openness to voluntary and market-based approaches as a complement to command-and-control instruments. The SOFO 2014 analysis largely confirmed the continuation of these long-term trends in 2007–2013.

Countries that amend national forest programs or forestry policies tend to include SFM as a broad national goal, which is essential if the provision of socioeconomic benefits is to be sustained over time. Many countries have

Summary of the socioeconomic benefits from forests, 2011

	AFR	ASO	EUR	NAM	LAC	World
PRODUCTION BENEFITS						
Income generation (billion US$)						
• Formal sector (value added)	16.6	260.4	164.1	115.5	49.4	606.0
• Informal production (for construction and fuel)	14.4	9.9	-	-	9.0	33.3
• Medicinal plants	0.1	0.2	0.4	n.s.	n.s.	0.7
• Plant-based NWFPs (excluding medicinals)	2.1	63.7	5.5	2.6	3.0	76.8
• Animal-based NWFPs	3.2	3.5	2.1	1.0	0.6	10.5
• Payments for environmental services (PES)	n.s.	1.2	n.s.	1.0	0.2	2.4
Total	**36.3**	**338.8**	**172.2**	**120.1**	**62.2**	**729.6**
(as percent of gross domestic product)	*2.0*	*1.4*	*0.9*	*0.7*	*1.2*	*1.1*
Beneficiaries (millions)						
• Formal sector employment	0.6	6.9	3.2	1.1	1.3	13.2
• Informal employment (for construction and fuel)	19.2	11.6	-	-	10.3	41.0
Total employees (millions)	**19.8**	**18.5**	**3.2**	**1.1**	**11.7**	**54.3**
(as percent of workforce)	*4.8%*	*0.9%*	*0.9%*	*0.6%*	*4.1%*	*1.7%*
• Forest owners (families and individuals)	8.2	4.7	7.2	3.3	5.7	29.0
Total beneficiaries (including employees)	**28.0**	**23.2**	**10.4**	**4.4**	**17.3**	**83.3**
(as percent of population)	*2.7%*	*0.5%*	*1.4%*	*1.3%*	*2.9%*	*1.2%*
CONSUMPTION BENEFITS						
Food security: availability (kilocalories/person/day)						
• Food supply from plant-based NWFPs	2.4	18.8	4.9	6.2	12.4	13.7
• Food supply from animal-based NWFPs	4.7	1.8	4.7	4.6	3.3	2.8
Total food supply from forests	**7.0**	**20.6**	**9.6**	**10.9**	**15.7**	**16.5**
(as percent of total food supply)	*0.3%*	*0.8%*	*0.3%*	*0.3%*	*0.5%*	*0.6%*
Food security: use (millions)						
• Number of people using fuelwood to cook	555.1	1 571.2	19.0	n.s.	89.6	2 234.9
• Number of people using charcoal to cook	104.5	59.0	0.2	n.s.	5.4	169.1
Total	**659.6**	**1 630.3**	**19.2**	**n.s.**	**95.0**	**2 404.0**
(as percent of population)	*63.1%*	*38.4%*	*2.6%*	*n.s.*	*15.9%*	*34.5%*
Energy supply (million tonnes of oil equivalent)						
• From forests	165.7	202.2	41.4	11.0	75.6	495.9
• From forest processing	15.6	91.2	86.7	49.8	33.1	276.5
Total	**181.2**	**293.4**	**128.1**	**60.8**	**108.8**	**772.4**
(as percent of total primary energy supply)	*26.9%*	*4.8%*	*4.9%*	*2.5%*	*13.4%*	*6.1%*
Shelter (millions of people using forest products)						
• Use of forest products for house walls	94.0	831.0	32.7	-	68.5	1026.1
• Use of forest products for house floors	20.2	194.0	28.7	-	25.3	268.3
• Use of forest products for house roofs	124.6	313.6	-	-	43.6	481.8
Use of forest products in any part of housing	**148.2**	**996.6**	**61.5**	**-**	**73.4**	**1 279.6**
(as percent of population)	*14.2%*	*23.5%*	*8.3%*	-	*12.3%*	*18.3%*
Health (millions of people)						
• Use of woodfuel to boil and sterilize water	81.9	644.5	-	-	38.6	765.0
• Use of herbal/home remedies to treat children's diarrhea	232.6	630.8	-	-	169.5	1 032.9
• Deaths due to indoor air pollution (from woodfuel use)	0.5	1.2	n.s.	-	n.s.	1.7

Note: AFR = Africa; ASO = Asia and Oceania; EUR = Europe; NAM = North America; LAC = Latin America and the Caribbean; n.s. = not significant; - = data not available. This analysis assumes that all income and employment in wood and woodfuel production in Europe and North America is captured in official statistics and recorded as part of the formal sector.

taken measures to strengthen the role of stakeholders in developing and implementing such policies, reflecting a broader trend away from exclusive state control towards governance that encourages stakeholder involvement.

Relatively few countries have specifically addressed poverty when amending national forest programs or forestry policies. This indicates a still-dominant technical paradigm of forest management, rather than a people-oriented (social) one, notwithstanding overall increased stakeholder participation. On the other hand, the integration of forestry into wider national poverty reduction strategies has improved. While forests feature in many rural development strategies, the alignment of national forest programs and forest policies with national strategies for development, energy and food security seems weak.

In many countries, inadequate capacity to implement the goals and intentions expressed in national forest programs

and policies seems to be a major bottleneck in achieving change on the ground. Comparatively few reported measures explicitly address adjustments of institutional frameworks to new needs and modes of governing. New and different capacities are needed to implement SFM with increasingly diverse stakeholders to grow the socioeconomic benefits of forests.

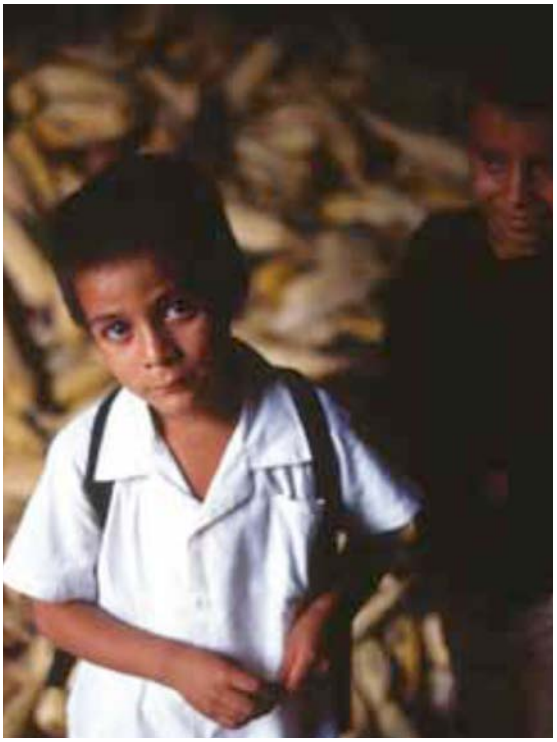
Strengthening links between policies and benefits

From the SOFO 2014 policy review and analysis, the following key points can be made.

- Forest policies need to focus more on benefits to people and to better reflect changing societal demands for the socioeconomic benefits of forests.
- Policies on SFM need to be backed by greater implementation capacity to realize the potential to enhance the socioeconomic benefits of forests.
- Providing people with greater access to forest resources and markets and improving the enabling environment for producer organizations are powerful ways of supporting access to markets, allowing more inclusive and efficient production and, ultimately, generating greater socioeconomic benefits.
- Greater policy recognition is needed of the socioeconomic benefits provided by forest environmental services.

SOFO 2014 drew the following three key lessons that could inform and shape the continued development of forest policies:

1. Forest policies must explicitly address the provision of food, energy and shelter.
2. More and better data are needed on the socioeconomic benefits of forests to make the case for forests and SFM.
3. To meet rising and changing socioeconomic demands, SFM must involve more efficient production techniques, including in the informal sector.



Forests for reducing poverty: The Honduran forest policy explicitly addresses poverty reduction, one of only a relatively few forest policies that do so. *Photo: G. Bizzari/FAO*

Conclusion

A common theme in SOFO 2014 is the importance of putting people at the center—for both the measurement of socioeconomic benefits and the development of policies and measures to enhance these benefits. If this is done, it seems likely that the socioeconomic benefits of forests can be developed to meet the growing demands of society while maintaining the integrity of the forest resource base. This will improve the prospects for SFM and demonstrate how forests should be conserved for the multiple benefits they provide. SOFO 2014 suggests ways in which this might be done; it is now up to countries to take action.

State of the world's forests 2014: enhancing the socioeconomic benefits from forests *is available in Arabic, Chinese, English, French, Russian and Spanish at: www.fao.org/forestry/sofo*

Linking conservation and livelihoods

Raising community awareness and improving livelihoods are key to the sustainable development of the Cibodas Biosphere Reserve in West Java, Indonesia

by Herry Subagiadi[1] and Harianto Arifin[2]

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The community and the forest: They should benefit each other. *Photo: Anggia Ananda, GGPNP*

ITTO project TFL-PD 019/10 Rev. 2 (M): *Developing collaborative management of Cibodas Biosphere Reserve in West Java, Indonesia*, which spanned 2010–2013, was part of ITTO's Thematic Programme on Forest Law Enforcement, Governance and Trade. Implemented by the Gunung Gede Pangrango National Park Authority under the Indonesian Ministry of Forestry, the project's strategic objective was to promote the conservation and sustainable use of biodiversity and environmental services of the Cibodas Biosphere Reserve (CBR), specifically by strengthening forest law enforcement and governance in the reserve.

The Cibodas Biosphere Reserve

The CBR is one of eight biosphere reserves in Indonesia; the Gunung Gede Pangrango National Park (GGPNP) functions as its core area. The CBR covers an area of 118 000 hectares, of which the GGPNP comprises 22 851 hectares. The CBR, which was formally adopted as a UNESCO Man and Biosphere World Monitoring Site in 1977, is located in the densely populated province of West Java and consists of the GGPNP, recreation and nature reserves, and community settlements.

The CBR is an important source of water for surrounding cities, such as Bekasi, Bogor, Cianjur, Jakarta, Sukabumi and Tangerang; more than 60 rivers flow from it. In 2010, the spring water debit of the GGPNP was estimated at 40–500 litres per second, and the annual economic value of the water for surrounding communities was Rp 4341 billion (US$370 million at the exchange rate current in July 2014). The CBR yields about 231 billion litres of surface water per year in four watersheds—those of Ciliwung, Cimandiri, Cisadane and Citarum. More than 20 million people in the Jabodetabek area of Bekasi, Bogor, Depok, Jakarta and Tangerang use this water.

The CBR is under pressure from encroachment and illegal land occupation, however. Sixty-six villages surround the core area of the CBR, and they pose a serious threat to sustainable management due to the prevalence of illegal agricultural activities, wood pilfering and hunting. Over time, such activities lead to forest degradation, which in turn contributes to flooding, soil erosion and irregular water supplies and perpetuates the poverty of the villagers themselves. If no action is taken, considerable negative impacts are inevitable, including flood disasters in Jakarta and other urban areas.

The project proposal defined the key problem as the poor implementation of good governance practices and ineffective law enforcement in the conservation and sustainable use of biodiversity and environmental services in the CBR. This key problem has at least three underlying causes: 1) a lack of stakeholder commitment to the sustainable management of the CBR; 2) the absence of an integrated strategic management plan for the CBR; and 3) limited community awareness of the need for the sustainable use of biodiversity and environmental services.

Cibodas Biosphere Reserve concept

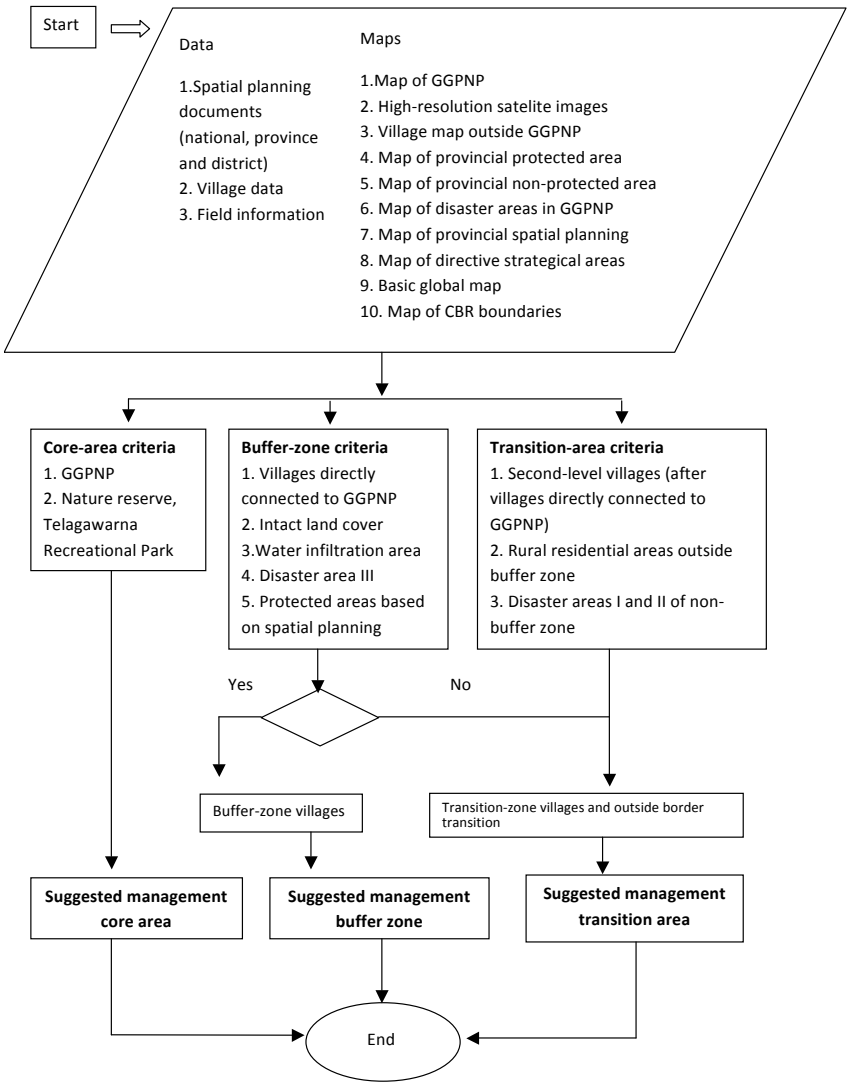
The biosphere reserve concept is about harmonizing conservation—be it on land, in coastal areas or at sea—with economic development. In the CBR, the ambition is to harmonize biodiversity conservation with sustainable development to achieve a balance between human need and nature. That is the vision that CBR managers strive to achieve, and it functions as the underlying value of day-to-day management operations.

Applying the biosphere reserve concept in the core area of the CBR (i.e. the GGPNP), therefore, is not solely about protecting the conservation area; it also requires an

integrated and unified effort to develop the surrounding area. Under the biosphere reserve concept, there is a close relationship between conservation and development, and realizing sustainable biodiversity conservation requires sustainable community development.

Improved governance and law enforcement is needed in the CBR to prevent encroachment, illegal logging and poaching. At the same time, the local community needs to understand the CBR concept and the benefits they gain from it. Proponents of the CBR have a responsibility to convince communities in the area that the implementation of the biosphere reserve concept can benefit them.

Figure 1: A proposal for rezoning the CBR



The Cibodas Biosphere Reserve: A management concept that balances conservation and development. *Photo: Anggia Ananda, GGPNP*

Community awareness on improving forest law enforcement

Law enforcement efforts in the CBR would achieve greater success with community support. If local people value the conservation outcomes supported by law enforcement, they will assist law enforcement by avoiding law violations and by actively cooperating with local law-enforcing institutions to prevent or uncover violations.

Awareness of the benefits of the CBR needs to be raised among local people. One of the project strategies was to develop a cadre of local trainers and extension workers with knowledge of the CBR. The project held training-of-trainers workshops involving primary stakeholders among community groups in the districts of Bogor, Cianjur and Sukabumi. Through these workshops, trainees were equipped with knowledge of the CBR and its management, its significance in supporting local sustainable development, the value of its biodiversity, and various aspects of strategic planning. The trainers now have the capacity to assist their own communities and others in the CBR, and local people have greater capacity for self-empowerment. This is important because the project aimed to build capacity in the communities to pursue sustainable economic development opportunities.

Having trained the trainers, the next step was to deploy them in the communities. The project facilitated a promotional campaign aimed at local people, assisted by 65 trainers who had been equipped with the necessary extension skills. These trainers met with local community groups, such as farmers, students and community leaders; they had direct dialogues with a total of 2639 people over a two-month period. As a result, there is now greater understanding in local CBR communities of the crucial role those communities can play in managing the CBR by limiting their environment-based livelihood activities to the buffer and transition zones outside the core area of the CBR.

Given the large area of the CBR, the project took a strategic approach in its choice of activities and implementation. While the aim is to realize sustainable development in the

CBR in the long term, the aim of this pilot project was to provide a learning laboratory and a model of sustainable development that could be replicated in other areas and further developed for wider application. During the project, three sustainable development activities were developed:

- ecotourism, and crafts (such as lanterns and handbags) using waste plastics, in Pasir Buncir Village, Bogor Regency;
- renewable energy (biogas and fertilizer) using cow manure in Langensari village, Sukabumi Regency; and
- organic farming in Ciputri, Cianjur Regency.

These activities also involved the participation of the local private sector and non-governmental organizations (NGOs) in establishing links with local markets for selling the products.

The development of environmentally friendly and environment-based livelihood activities is part of achieving a balance between humans and nature in the CBR. The project demonstrated such activities among communities and amplified the learning through training involving local communities in three districts. By these means, the local communities gained not just knowledge but also skills, and they now have a greater range of options for augmenting their incomes while not breaking the law through, for example, encroachment, illegal logging and poaching.

Other factors contributing to effective law enforcement

Other factors that contribute to effective law enforcement are the legal framework that regulates the CBR and the human-resource capacity to implement it. The project conducted training on forest laws and regulations that apply in the CBR through multistakeholder workshops involving law-enforcement officers (e.g. civil-service police, the justice department, public prosecutors and forest rangers in Bogor, Cianjur and Sukabumi districts) and other stakeholders, including NGOs. Through their representatives, law-enforcement agencies in the three districts received insights into the relevant regulations and policies. Open discussions, experience-sharing and hypothetical crime case methods were used to improve understanding among law-enforcement officers and to provide them with insights into effective law-enforcement operations and the use of the right regulations in the right circumstances. The policies and regulations were disseminated more widely, too, mainly by reproducing them and distributing them to various parties and stakeholders.

The project was unable to have an impact on sectoral policies and programs, but it initiated certain actions that will ultimately have positive effects, as follows:

- A proposal to rezone the CBR to encompass a larger land area and a larger number of villages (Figure 1), if adopted, would help improve the efficiency and effectiveness of development policies and programs at the district level of government.
- Adoption of the integrated strategic management plan, a final draft of which was produced by the project, would influence the development of policies and programs at the central, provincial and district levels, especially the prioritization of programs and actions, as well as state budget appropriation.
- The drafting of a PERDA (Indonesian regional/district regulation) on CBR development initiated by the project will be continued by a work group composed of district government institutions in three districts. When adopted, it will change the development policy and program at the provincial and district levels.

The capacity to grow, and the future

One of the main conclusions made at project completion was that the support of local stakeholders was easily obtained because of the inclusion in the project of a major component aimed at improving livelihoods, thus increasing the likelihood that both conservation and poverty-alleviation efforts would be successful and mutually supportive. The importance of the project is that it has nurtured a seed of sustainable development by: improving the capacity of the communities and law-enforcement agencies; generating improved data; initiating policy development initiatives such as the integrated strategic management plan; introducing new livelihood opportunities; and generating other tangible outputs. The increased knowledge, skills and experience will enable continued progress, with community awareness of the benefits of sustainable use providing the driving force. Through the project, ITTO has contributed to sustainable development and conservation in the CBR.

Law enforcement officers: Community support, human resources and the quality of the legal framework are contributing factors to efficient law enforcement. *Photo: Anggia Ananda, GGPNP*

Rehabilitating and using bamboo forests in Peru

An innovative ITTO project has launched a sustainable development initiative to improve the livelihoods of communities using bamboo

by Josefina Takahashi
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Vegetable steel: Workers load recently harvested bamboo onto a truck for transport to a construction site in Aramango District, Amazonas, Peru. *Photo: J. Takahashi, PERUBAMBU*

South America is rich in woody bamboo species, and Peru has its fair share. Given its biological, physical, chemical and mechanical properties and relative abundance, bamboo has enormous potential to contribute to Peru's socioeconomic development—bamboo forests cover 3.6 million hectares (ha) of the country, which is about 3% of the total land area (INRENA 1996).

The largest areas of bamboo in Peru are in the south; bamboo resources are smaller in extent in the high forests of the central and north regions but more biodiverse, consisting of more than 60 species (Takahashi and Ascencio 2004), most of them not yet studied. High rates of deforestation continue in those regions, mostly due to the expansion of the agricultural frontier. Peru's current deforestation rate is estimated at about 182 000 ha per year, increasing by an estimated 10% per year, especially in the San Martin and Amazonas regions (formerly called departments) in the central north of the country. The GDP per capita in those regions was S/.2695 (US$969) and S/.2709 (US$974), respectively, in 2013, which was only about one-tenth the GDP per capita in Lima (S/.25 748, or US$9262) in that year (INEI 2013).

Despite their low economic status, San Martin and Amazonas have significant potential for rapid socioeconomic development, including through the sustainable use of bamboo. For example, they have good road access and communication with a large number of rural and native communities (including 146 Awaruna communities), and small farmers are interested in the sustainable harvesting and processing of bamboo, particularly *Guadua angustifolia*.

Project to promote sustainable use of bamboo

ITTO project PD 428/06 Rev.2 (F) was financed by ITTO with counterpart funding from PERUBAMBÚ in cooperation with Peru's National Institute for Natural Resources (INRENA) and the regional governments of San Martin and Amazonas. The project's strategic objective was to promote the rehabilitation, management and sustainable use of bamboo in Peru's central north. The project aimed to produce three main outputs: 1) the training of local communities in techniques for the rehabilitation, management and sustainable use of bamboo forests; 2) the rehabilitation and reforestation of 200 ha of forest using bamboo species; and 3) the socioeconomic development of local communities based on their active participation in project activities and resultant economic benefits.

Bamboo resources in the project area

Natural bamboo formations and plantations were identified in the district of El Milagro (Utcubamba Province) and the districts of Aramango and Imaza (both in Bagua Province) in the Amazonas Region. In general terms, these bamboo formations, often managed by single families, are small in size and there is insignificant connectivity between stands, with the exception of old bamboo plantations, and they range in area from 0.5 ha to 5 ha. The bamboo forests are small due to the rapid expansion of the agricultural frontier, particularly for the production of rice, which has become the major commercial crop in the district of Bagua (also part of Bagua Province). The biggest loss of natural bamboo

Rich forests: In the project area, natural forests containing bamboo stands could sustain annual harvests of 1750–2275 culms per ha. *Photo: J. Takahashi, PERUBAMBU*

formations to rice cropping has occurred in the San Martin Region, except in remote areas belonging to native communities and in the Atumplaya Bamboo Protection Forest.

Production potential and value

A forest inventory in the Amazonas and San Martin regions, combined with studies on bamboo diversity in the forests of the area and on the physical and mechanical properties of bamboo culms, all conducted under the project, indicated that natural and planted forests of *Guadua angustifolia* and other similar bamboo species have an average harvestable capacity of 50–65% of total mature stems, with productivity levels similar to those found in Asia, such as in Anji County, Zheijiang Province, China. *Guadua* is known as "vegetable steel" because of its extraordinary physical and mechanical properties, which make it suitable for construction and furniture manufacturing, among other potential applications that are yet to be studied. In the project area, natural forests containing bamboo stands could sustain annual harvests of 1750–2275 culms per ha. In 2009, 6-metre culms were selling at US$0.75–US$1.00, meaning that the communities could obtain US$1312–2012 per ha per year from bamboo harvesting, in addition to their regular income from other activities.

The application of adequate drying and preservation techniques using environmentally friendly products could increase the value of culms, other parts of which could also be marketed for various uses, at US$0.25–0.30 per culm. Therefore, the income that the local communities could have received in 2008 as a result of the direct use of bamboo resources and improvements in the production chain was US$2000 per ha per year. Rehabilitating degraded areas and increasing the value-added component of craft production could boost income to more than US$3000 per ha per year, similar to the amount invested per ha by the project over its lifetime.

Taxonomic studies

The main objective of the taxonomic studies was to identify bamboo varieties with the morphological characteristics of *Guadua angustifolia*. In the project area, there are at least three *Guadua angustifolia* biotypes, which were identified using molecular microsatellite markers (Posso et al. 2012). It was determined that the genetic variability of the biotypes in Peru is higher than that found in Colombian biotypes, leading to the identification of two new *Guadua* species in Peru (Londoño 2013).

Training strategy

The project developed an intervention, dissemination and training strategy in coordination with the technical authorities of the regional and local governments in the project area. The training of local rural communities, who mostly live in poverty, was carried out through training workshops focused on field practices and the development of skills in sustainable bamboo management and harvesting, as well as the identification of silvicultural and economic characteristics of plots containing bamboo stands. It was demonstrated that bamboo forest stands established in agroforestry systems in their early stages of development and then grown as dominant forest species can be more profitable than any other annual or biannual agricultural crop. Thus, small farmers showed a preference for this resource over other reforestation alternatives with forest tree species.

Reforestation with bamboo

A total of 246 ha of degraded lands of very-low-income families were reforested with bamboo under the project, mostly divided into plots of 0.5–5 ha each and distributed throughout 15 districts in the Amazonas and San Martin regions. In addition, training and monitoring activities were carried out for the rehabilitation and management of 13 950 ha of natural bamboo forests in native community areas, such as the native community of Yarau in the Awajun District, Rioja Province, San Martin. Seven nurseries were established for the production of organic bamboo seedlings (i.e. free of pesticides and inorganic fertilizers) in exchange for labour and transport provided by project beneficiaries.

Capacity building

Local capacity building for primary bamboo processing began with the training of community members in Aramango District, Amazonas, in basic techniques for the construction of housing as part of a program to build a facility called MINCABAMBÚ (7 m high and covering 350 m^2) entirely with bamboo. Local communities now use MINCABAMBÚ as a bamboo training and processing centre, the only facility of its kind in Peru. In this centre and in other local offices, the project provided training in basic furniture- and craft-manufacturing techniques. A wide range of craftspeople, farmers and members of native communities and other settlements participated in these activities, including women and youth living in poverty—women account for 47% and 45% of the economically active population in the Amazonas and San Martin regions, respectively.

The project directly trained at least 300 people in its target area, and, on this basis, the number of direct and indirect project beneficiaries was close to 5000 people, comprising family members (2000 people); community users of bamboo for housing, household utensils and agricultural purposes (2000); manufacturers of bamboo handicrafts for commercial purposes (150); timber loggers, who received information on the sustainable management of tropical forests (250); bamboo distributors (50); builders (50); and other local farmers and craftspeople (250).

Other important project beneficiaries were the technical staff of the General Directorate of Forestry and Wildlife (*Dirección General Forestal y de Fauna Silvestre*—DGFFS) and the professional staff of national, regional and local institutions involved in forest and natural resource research. Staff members were involved directly in the project's research activities and contributed their local knowledge and experience to the attainment of the project's specific objectives. At the same time they benefited from direct access to training on techniques for the rehabilitation and sustainable management of forests with bamboo stands.

Commercial potential in Aramango

Aramango District has one of the largest *Guadua angustifolia* bamboo forests in the region, and most of it occurs close to the paved road that links Aramango to the provincial capital. To assess the present and future potential of bamboo forests in Aramango, an inventory was carried out in more than 90% of the plots present in the area. It was determined that the 86 plots belonging to project beneficiaries covered a total of 76 715 ha; these are harvested for commercial purposes, but fewer than 50% are adequately managed. For all plots, the number of shoots and green, mature and over-mature culms was assessed in a representative sample of 5% of the area of each plot, randomly divided into 100 m² subplots. A preliminary projection of the production of bamboo culms found that 50% would be available for harvesting by 2012 and that the annual potential value of trade in culms from about 100 ha of forest exceeded US$500 000 in 2013, assuming an average price in 2012 of US$0.50 per m per culm (10 cm in diameter x 6 m in length). Moreover, culms with a diameter of 12.5 cm are now being sold for as much as US$0.54 per m, while the same type of culm in 2009 sold for US$0.75–US$1.00 per 6-m culm; in other words, the price of bamboo culms has increased by as much as 400% due to the project's promotion and demonstration of the potential of this product and improvements in the quality of culms extracted from managed forests. Elsewhere in the project's area of influence, prices for bamboo canes increased by 600% as a result of improvements in the bamboo production chain.

These results have attracted the attention of local and national authorities, who are now interested in pursuing the production of forest resources other than traditional timber species. This interest led to the approval of technical standard E.100-Bamboo (with the active involvement of PERUBAMBÚ) for bamboo construction in the public and private sectors. The establishment of this technical standard enables the development and implementation of government construction projects such as housing, schools and healthcare centers, which previously exclusively used brick and mortar, concrete and iron.

Learning by doing: Local capacity building included community training in house construction techniques as part of a program to build MINCABAMBÚ.
Photo: J. Takahashi, PERUBAMBU

More than 246 hectares in Amazonas and San Martin were reforested with bamboo; the sustainable commercial—and hence economic—potential of this area in the medium term was estimated by the project at US$5880 per ha per year. This forest resource is also highly environmentally friendly given its capacity for carbon sequestration, erosion control and water resource management.

Consolidating project results

The project successfully promoted the biological and physical–mechanical properties of bamboo and enabled participants to greatly increase the prices they obtain for their bamboo canes. The project has motivated local communities and authorities to consider bamboo as a suitable material for the rehabilitation and reforestation of degraded forestlands in areas at high risk of erosion and forest-cover loss. It will be necessary to continue activities to meet the requirements of those communities that did not benefit from this phase of the project and which have repeatedly requested technical and financial support from the project implementers.

The rehabilitation and reforestation program can contribute to the economic and environmental development of both the Amazonas and San Martin regions, although it requires further consolidation. The development of technologies for the management of bamboo resources and the processing of bamboo into value-added products will enable Peru to strengthen its conservation of moist tropical forest ecosystems and consequently the conservation of the biodiversity they contain.

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Master plan for Cameroon Estuary mangrove forests

An ITTO project has helped develop a plan to save a crucial forest ecosystem from destruction while improving local livelihoods

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The beginning: A community organizer shows a mangrove propagule at a mangrove nursery at Londji, Cameroon. *Photo: P. Ngokoy*

Cameroon's mangrove forests in the vicinity of the Douala-Edéa Wildlife Reserve and related watersheds, including those of the Moungo, Wouri and Dibamba rivers, are known collectively as the Cameroon Estuary mangroves. They constitute an ecosystem of critical importance, but they are under pressure. Between 1985 and 2010, an estimated 20–25% of the area's mangrove forests was lost due to anthropogenic activities.

As a result, there has been a marked and accelerated degradation of the resource, leading to decreased productivity. Threats to the Cameroon Estuary mangroves include:

- urbanization and industrialization in large cities such as Edéa, Kribi, Tiko and Yabassi, and explosive population growth in Douala;
- the "global" nature of Cameroon's forest law, while issues specific to mangrove forest ecosystems are unaddressed;
- the expansion of agro-industrial plantations;
- the illegal logging of mangrove timber, which is used as fuelwood by 30% of households in large cities such as Douala and Tiko, and the high demand for construction poles;
- overfishing and illegal fishing;
- chemical pollution by industries and agro-industries, which discharge their wastes directly into mangrove forests;
- accelerated siltation caused by soil losses upstream of the mangrove forests;
- the construction of infrastructure such as ports and roads in coastal areas;
- oil and gas industries and other development projects; and
- the lack of environmental education among people in Douala, Tiko and other cities, who are generally unaware of the multiple functions of forests in general and mangrove forests in particular.

It is estimated that only 30–35% of the Cameroon Estuary mangrove ecosystem has adequate conservation status.

Pilot actions for developing a master plan for Cameroon Estuary mangrove forests

With assistance from an ITTO project, Cameroon's Ministry of Forestry and Wildlife (MINFOF) has developed the first master plan for the sustainable management of the Cameroon Estuary mangrove forests. Cam-Eco, a non-governmental organization based in Edéa, developed the project for the collaborative rehabilitation and

Ready to burn: A pile of mangrove fuelwood in a woodyard near the city of Tiko in Cameroon. Overharvesting is one of the threats facing Cameroon's mangrove forests. *Photo: P. Ngokoy*

management of watersheds in the coastal areas of the Douala-Edéa Wildlife Reserve (the "Douala-Edéa mangrove project"). The Government of Cameroon subsequently submitted the proposal to ITTO, and the International Tropical Timber Council approved and funded the project in 2009 (as ITTO project PD 492/07 Rev.3 (F)).

The project was implemented through a collaborative process involving nearly 1600 people representing various social groups, such as traditional chieftains, local and indigenous communities, women, local officials, administrations, development-support organizations, experts and researchers. Its aim was to contribute to the management of mangrove ecosystems in the Douala-Edéa Wildlife Reserve and related watersheds. It had three major outputs:

1. A collaborative management plan for the mangrove ecosystems neighbouring the Douala-Edéa Wildlife Reserve.
2. The establishment or enhancement of 21 "common interest groups" (CIGs) involving more than 900 people, and their engagement in the development of a range of income-generating activities (Table 1). Participating groups increased their revenue by an average of nearly 40%; they improved their living standards. As project implementation proceeded it became clear that women and men had different preferences regarding income-generating activities. For example, women favoured poultry and vegetable production, as well as nursery production for forest regeneration. Men focused predominantly on fish farming and honey production.
3. The establishment of three forest areas as community forests (Table 2), for which MINFOF issued three "interim management conventions".

Vision and strategic pillars of the master plan

The Master Plan for the Cameroon Estuary Mangrove Forests, which was developed under the project, introduces a global vision for the management of mangrove forests and watersheds in the Douala-Edéa Wildlife Reserve to 2035. The vision is:

> "Productivity is stable in the mangrove forests in the coastal area of the Douala-Edéa Wildlife Reserve,

Table 1: Major income-generating activities conducted with the 21 common interest groups through PD 492/07 Rev.3 (F)

CIG	No. of CIG members	% of CIG members who are women	Major income-generating activities conducted
Dibeng Community Forest	135	31	• Use and sale of timber products • Use and sale of non-timber forest products • Beekeeping
Bessombè Community Forest	88	10	
Mossé Community Forest (Nyoko Nè Kom)	82	55	
Bopo Community Forest	119	48	
Mbanda Community Forest	58	16	
Kopongo Community Forest	72	19	
Ndokohi Community Forest Le Progrès des femmes	60	100	• Food crops (cassava, macabo, plantains, tomatoes) • Small-scale breeding (broilers, cockerel) • Beekeeping
Espoir de Ndogbélé	22	12	
Les Débrouillards de Dibeng	45	31	
Secours de Ndogbélé	18	16	
Agropastoral du Nkam	25	40	
Dynamique de Yabassi	12	25	
Femmes Rurales de Ndoktock	17	100	
Femmes Actives de Mbengue	22	100	
"AGECO" de Mouanko	32	85	• Fish-farming • Small-scale breeding (broilers, cockerel) • Beekeeping
"APJN" de Mouanko	14	18	
Manoka Fishermen Association	19	0	• Responsible fishing
Mbwang Fishermen Association	13	0	
CIG for the Protection and Regeneration of Londji Mangrove	23	52	• Reforestation of degraded mangrove forest areas • Beekeeping
"IVAHA"	18	48	
Douala "VA-Mangroves"	39	24	

Table 2: Community forests established as a result of PD 492/07 Rev.3 (F)

Name of community forest	Land area (ha)	Associated villages	Main objective
Dibeng	5000	Dibeng village/Yabassi district	Promote community-based sustainable management of community forest resources
Bessombè	2500	Bessombè village/Dibamba district	
Mossé (Nyoko Nè Kom)	2000	Mossé village/Yingui district	

which supports rich biodiversity and provides environmental, social and economic goods and services for the wellbeing of existing and future coastal and indigenous people."

The Master Plan has seven strategic pillars, as follows.

- *Strategic pillar 1* ("law, regulation and institution-related components") aims to establish a specific legal and regulatory framework for the management of mangrove forest ecosystems.
- *Strategic pillar 2* ("conservation and sustainable management") aims to rehabilitate degraded areas and maintain or increase existing conservation areas in the Cameroon Estuary (parks, reserves, etc.).
- *Strategic pillar 3* ("collaborative and fair management") aims to involve people who neighbour mangrove forests, as well as other stakeholders, in management activities through the establishment and management of community forests, including mangroves and watershed uplands, and in the development of detailed maps through a collaborative process. Such maps will serve to demarcate the limits of "village mangroves" between mangrove forest communities and fishing camps, etc.
- *Strategic pillar 4* ("sustainable development of infrastructure projects") requires large economic and agro-industrial development projects to take into account the vulnerability of mangrove ecosystems and mitigate their negative impacts (e.g. through environmental and social impact surveys).
- *Strategic pillar 5* ("sustainable fishing and development of other environmentally friendly socioeconomic activities") aims to promote income-generating activities for mangrove-resource-dependent people and to ensure that the regulations in place for responsible fishing in the mangrove forest areas are observed.
- *Strategic pillar 6* ("climate and sustainable energy") aims to mobilize funds through REDD+ and the Clean Development Mechanism for the development of alternative energy sources to avoid the over-harvesting of mangroves for woodfuel.
- *Strategic pillar 7* ("continuous environmental monitoring, pollution monitoring and establishment of a mangrove observatory") aims to implement a continuous pollution-monitoring system in the coastal zone and to establish a mangrove observatory involving all stakeholders.

Restoration: Strategic pillar 2 of the Master Plan aims to rehabilitate degraded areas and maintain or increase existing conservation areas in the Cameroon Estuary, such as here in Londji. *Photo: P. Ngokoy*

Prospects for the Master Plan

The Minister of Forestry and Wildlife has recognized that one of its major challenges is to "ensure the sustainability of the coastal zone in the future for economic and community growth". The project clearly showed that, if appropriate measures and related activities are not taken to reverse the current rate of degradation, all mangrove forests in the Cameroon Estuary will lose their productive, environmental and sociocultural production capacity by 2035. The following actions are planned:

- the dissemination of the Master Plan and extension among all stakeholders and the wider public; and
- the mobilization of financing and materials for implementing the management measures specified in the Master Plan.

At the regional level, Cameroon's efforts could inspire other Congo Basin countries and beyond because the threats faced by mangroves are similar in most countries. A regional project may be an appropriate approach to the sustainable and collaborative management of mangrove ecosystems, the environmental, economic and social importance of which is acknowledged by all.

Making the most of NTFPs

An ITTO project in the Philippines has provided local communities with training to increase their income from locally available non-timber forest products

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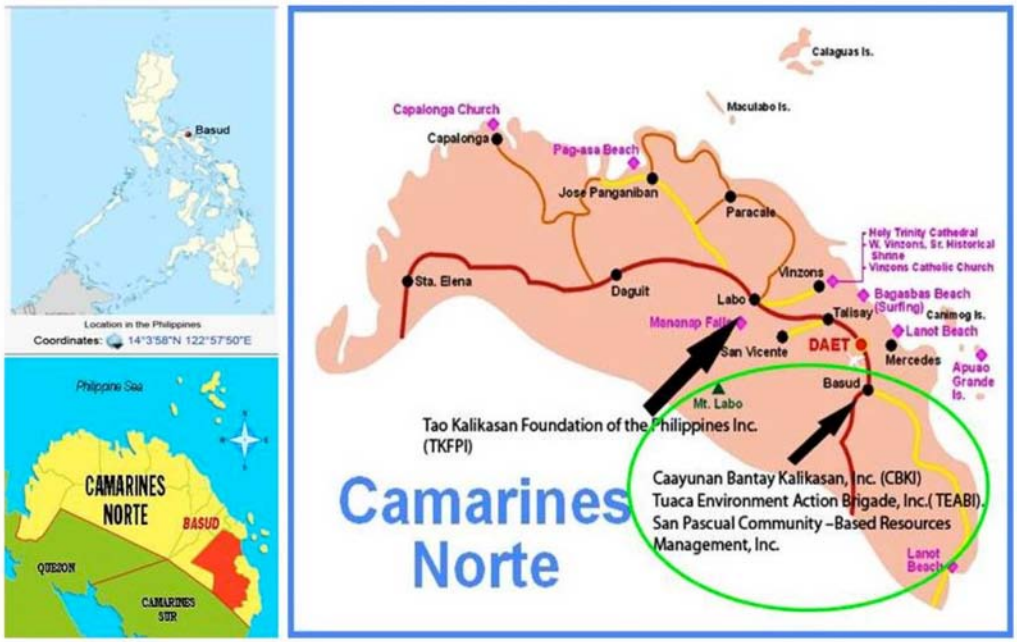

Figure 1. Location of the project sites

Using lessons learned in implementing various people-oriented forestry programs, the Government of the Philippines has developed a sustainable, equitable and holistic approach called community-based forest management (CBFM). Created in 1995 by Executive Order 263, CBFM is a national strategy for promoting social justice and the sustainable development of forestland resources.

As well as encouraging community participation, CBFM and earlier programs have given attention to a wide range of non-timber forest products (NTFPs) found in community-managed areas. The harvesting of NTFPs creates livelihood opportunities, especially if they are marketed as finished products such as handicrafts, wall decorations and other novelty items.

A recently concluded ITTO project—*Sustainable utilization and marketing of selected non-timber forest products to support the handicraft industry and the development of rural communities* [PD 448/07 Rev. 2(1)]—implemented in three CBFM areas in the municipality of Basud in Camarines Norte Province, the Philippines (Figure 1), assisted in this undertaking. The project aimed to promote and develop NTFPs to optimize their commercial potential as handicrafts, ensure the long-term viability of those industries and assist the development of rural communities. The three CBFM areas are Tuaca Environment Action Brigade, Inc. (TEABI); Caayunan Bantay Kalikasan, Inc. (CBKI); and San Pascual Community-Based Resources Management, Inc. (SPCBRMI).

Project training in value-added NTFP products

Tiger grass

The most important product in the San Pascual community is tiger grass (*Thysanolaena maxima*), known locally as "tambo". Tiger grass can be grown as a main crop or interspersed with fruit trees and other perennial crops; it thrives at medium to high elevations, particularly on hill slopes and in logged-over areas. The main harvestable component is called panicle, which is a branching inflorescence in which small flowers are borne along an elongated axis.

Tiger-grass plantations are located within a 30-minute walk of San Pascual village. The panicles usually develop between October and December and are harvested when the stalks reach 70 cm in length. Around 75% of the San Pascual community—both men and women—are involved in collecting the panicles over the three-month harvesting

New broom: Community members receive training on the production, collection and processing of tiger grass for handicrafts.
Photo: A. Ella, FPRDI

season (January to March). Harvested panicles are sun-dried for 2–3 days and then shaken or patted to remove the seeds, after which they are bundled to form sturdy brooms or "walis tambo". These are sold at a wholesale price of PHP[Philippine Pesos]120 per piece (US$2.80) and a retail price of PHP150 (US$3.50) in nearby Daet, the capital of Camarines Norte Province. Families earn an average of PHP5300 (US$123) per month from the sale of tiger grass during the lean season. The government is now promoting tiger-grass farming to boost the country's broom industry. Tiger-grass production and broom-making are important sources of livelihood for farmers and forest settlers in this CBFM area.

Anahaw

Another important NTFP in all three communities is anahaw (*Livistona rotundifolia*). In aggregate, 42 hectares of land is planted to anahaw in TEABI, while the species grows naturally in CBKI and SPCBRMI. Anahaw is used widely as a roofing material, but seminars on anahaw harvesting, propagation, weaving, bleaching and dyeing conducted under the project have alerted the communities—especially the women—to the possibility of developing lucrative backyard industries by weaving anahaw leaves into fancy fans and other decorative items. The fans sell for PHP7 (US$0.20) each. Although the industry is new, families could sell an average of 100 anahaw fans per month, generating a monthly income of PHP700 (US$16.30) on a contract basis.

Helping hand: Members of the project communities receive training on harvesting, processing, propagation, weaving, bleaching and dyeing of anahaw for handicrafts. *Photo: A. Ella, FPRDI*

Manila elemi resin

Another economically important NTFP is Manila elemi resin, derived from pili (*Canarium ovatum*). Camarines Norte is in the Bicol Region, which contains 72% of all productive, naturally growing pili trees in the six regions in which the species occurs. But pili farmers in Bicol don't tap the trees for resin, instead cultivating it for its kernel, an important ingredient in candies and confectioneries. The ITTO project provided people in the three CBFM areas with training—including hands-on exercises and work experience—on sustainable resin-tapping practices. Manila elemi resin has a wide range of uses, for example in pharmaceutical products such as plasters as well as in printing inks, lithographs and perfumes. Locally, the resin is used in torches, for starting domestic fires, and in the caulking of boats.

The training provided by the project was a tremendous success. The trainees showed their enthusiasm by participating actively in discussions, hands-on exercises and work experience in the field. The development of Manila elemi resin-tapping as an alternative livelihood option for farmers and pili growers has two major strengths: the supply of resin is expected to be plentiful because of the large number of *Canarium* trees growing in the area; and farmers and pili growers are now trained in the proper methods of Manila elemi resin-tapping.

Tapping the resource: Community members receive training on improved tapping of *Canarium* trees for Manila elemi resin. *Photo: A. Ella, FPRDI*

Conclusion

The ITTO project taught new methods for making use of NTFPs in the CBFM areas of three communities through seminars, hands-on training and work experience. The communities are now better equipped to boost their livelihoods while managing the forest resource sustainably. The strengthening of locally based producer organizations has also increased the potential for long-term commercial success by boosting market power and providing producers with ongoing technical support. The project identified several areas where further work would help fully harness NTFP resources, including the massive propagation of the three species discussed in this article (*Thysanolaena maxima, Livistona rotundifolia* and *Canarium ovatum*) to expand their plantation areas; and the construction of farm-to-market roads to CBFM sites to help local people get their goods and products to market.

Reducing logging impact in Gabon

A study compares the impacts of different logging practices on above-ground biomass in production forests in Gabon

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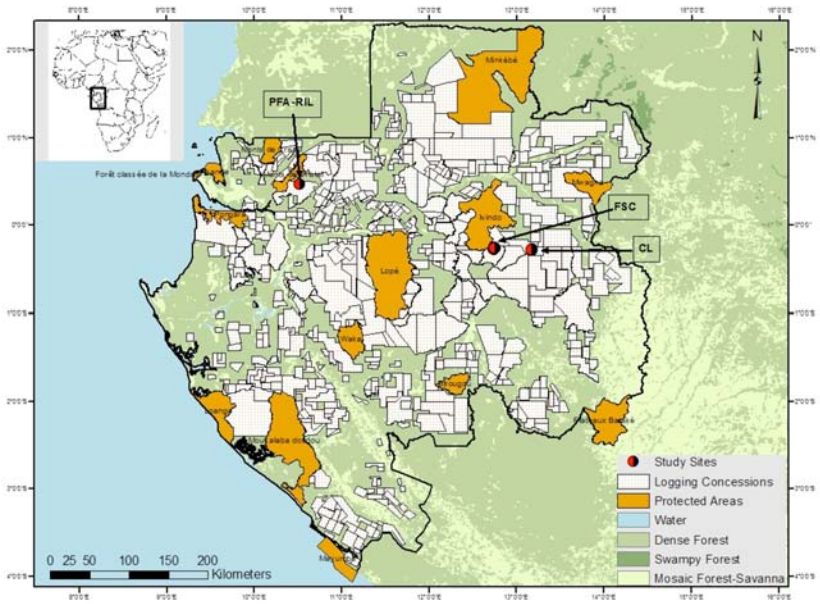
Timber harvesting is a major socioeconomic activity in Gabon (de Wasseige et al. 2009); it contributes considerably to Gabon's domestic product and is the country's second largest formal employer, employing 28% of the active population (WRI 2009). In accordance with the 2001 Gabon Forest Code, production forests are classified under several licence types: forest concessions under sustainable management (CFADs); associated forest permits (PFAs); and mutual agreement licences (PGGs; WRI 2009). All licence types are characterized by specified forest management methods and the presence (or not) of a management plan or certification.

Logging is a major cause of forest degradation and related carbon emissions in Gabon (Nasi et al. 2012; Pearson et al. 2014). On the other hand, it could serve as an opportunity for silvicultural treatment if carried out using good practices. In view of the importance of logging in the country's economic development, and given the country's strategy for reducing carbon emissions caused by logging (GoG 2013), it is essential to evaluate the impacts of various logging techniques with a view to determining policy measures for reducing carbon emissions and forest degradation and maintaining forest productivity.

Methods

Surveys were conducted in three forest concessions in Gabon: a PFA concession using reduced-impact logging (RIL) techniques with the assistance of a non-governmental organization (the Tropical Forest Foundation—TFF) specializing in RIL practices (the "PFA-RIL site"); a CFAD concession certified by the Forest Stewardship Council (FSC), where RIL techniques are applied (the "FSC site"); and a PFA concession without a management plan, where conventional logging (CL) is used (the "CL site") (Figure 1). The main objective of the surveys was to evaluate and determine the logging technique that minimizes: damage to the remaining stand; the loss of forest carbon; and negative impacts on biodiversity. In each concession, randomly located 1-hectare permanent plots were established, and all trees with a diameter above or equal to 10 cm at breast height were measured, mapped and identified before logging. After logging, collateral damage to trees resulting from logging activities was evaluated in the plots, in forest openings due to felling, along skidding trails and logging roads, and on landings at each survey site.

Figure 1: Locations of the study sites



Outcomes and discussion

The surveys showed that the loss of biomass and its equivalent carbon dioxide (CO_2) (hereinafter called "carbon stocks") vary according to the volume of timber extracted and the logging technique used. At the PFA-RIL site, the logging of 0.82 trees per hectare resulted in a 8.1% reduction in the initial carbon stock (Medjibe et al. 2011). At the FSC site, a logging rate of 0.39 trees per hectare resulted in a 7.1% loss of the initial carbon stock. At the CL site, the logging rate of 0.76 trees per hectare resulted in a 13.5% loss of the initial carbon stock (Figure 2).

The number of damaged trees per logged tree was highest at the CL site and lowest at the FSC site, and the density of roads and skid trails was also highest at the CL site (Table 1). Skidding operations damaged an average of 0.07 trees per metre of trail at the FSC site, 0.11 trees per metre at the RIL-TFF site, and 0.17 trees per metre at the CL site. On average, forest road construction damaged 0.16 trees per metre of road at the FSC site and 0.41 trees per metre at the CL site.

These results show that conventional logging is a major source of forest degradation and forest carbon emissions, but also that RIL and reduced logging intensity can greatly reduce both degradation and forest carbon emissions (Medjibe et al. 2013). The good planning of logging roads and skid trails in forest concessions is essential for minimizing the negative impacts of logging on forest ecosystems.

The PFA-RIL and FSC sites used RIL techniques, which involve the planning of logging operations in advance, worker training, the planning of roads and skidding trails, and controlled logging. At the CL site, where these practices were not employed, biomass loss and damage to remaining stands were substantially higher.

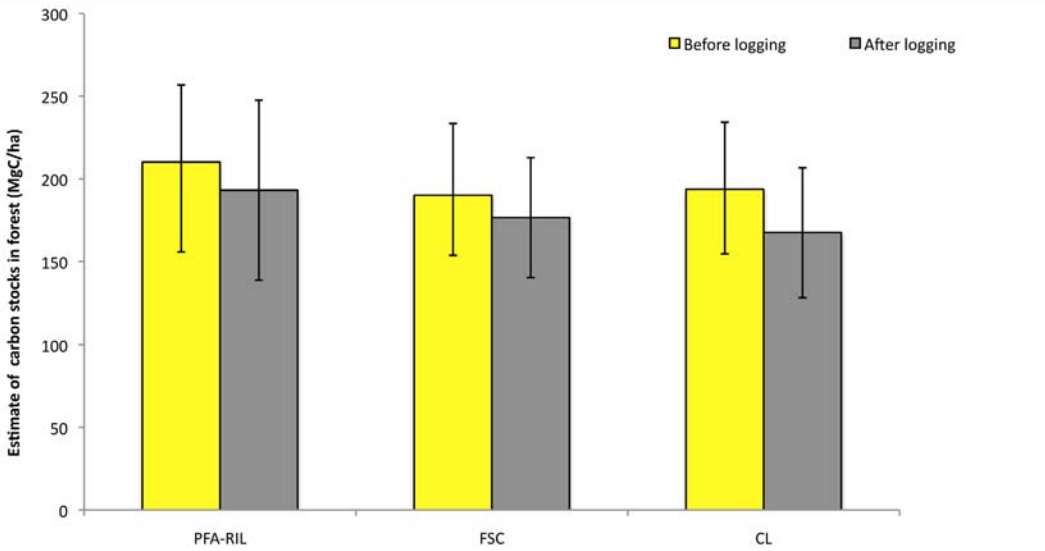
Measuring the extent of degradation caused by logging operations is a challenge for countries in Central Africa, but it might be possible to estimate degradation with reasonable accuracy by combining field studies and remote sensing data (see Pearson et al. 2014). Similar surveys to the ones reported in this article would need to be

Table 1: Comparative analysis of impacts of various forest logging techniques in Gabon

Variable	Site		
	PFA-RIL (n = 1)	FSC (n = 1)	CL (n = 1)
Survey site land area (ha)	50	508	200
Number of (1-ha) plots	10	20	12
Tree density (trees/ha)	453	304	387
Basal area (m^2/ha)	31.1	26.7	31.3
Initial carbon stocks (MgC)	210.2	190.0	193.7
Logging intensity (m^3/ha)	8.1	5.7	11.4
Number of damaged trees per logged tree	11.0	7.1	19.3
Carbon stock loss (%)	8.1	7.1	13.5
Carbon in logs (MgC)	4.3	2.8	2.4
Carbon in trees damaged by logging (MgC)	8.2	6.1	11.3
Carbon in trees damaged by skidding (MgC)	4.7	2.7	5.6
Carbon in trees damaged by road construction (MgC)	-	31.2	24.0
Emissions released per m^3 of logged tree ($MgCO_2eq/m^3$)	0.26	0.30	0.31
Skid trail density (m/ha)	69.0	45.6	86.1
Road density (m/ha)	-	7.8	16.2
Total land area affected by skidding (%)	2.8	1.7	4.5
Road width (m, average ±1 standard error)	-	18.3 ± 4.1	65.5 ± 20.3

Notes: PFA-RIL = PFA concession using RIL techniques with the assistance of the TFF; FSC = CFAD concession certified by the FSC, where RIL techniques are applied; CL = PFA concession without a management plan and using conventional logging techniques.

Figure 2: Estimate of carbon stocks (average ± standard error) in forests before and after forest logging in the PFA-RIL, FSC and CL sites, Gabon



conducted in a number of forest concessions with different types of logging licences in order to better understand the variability of logging impacts on forest carbon. Such surveys could be coupled with remote sensing data to estimate the area of forest logged under various regimes.

Conclusion

The time has come to improve logging practice in Congo Basin forests. The Central African Forest Commission (known as COMIFAC) has a stated objective of reducing forest carbon emissions through good logging practices and sustainable forest management. This survey, the first of its kind in Central Africa, will serve as a tool for policymakers in establishing measures for forest carbon conservation while promoting sustainable timber production.

Logging in Gabon focuses on a single, highly valuable tree species, okoumé, which requires a high light level for regeneration and growth. The use of RIL techniques minimizes damage to remaining stands and, in so doing, reducing the loss of forest carbon. It also reduces the size of forest gaps, however, which may affect the regeneration of okoumé. It is therefore necessary to apply silvicultural techniques to promote regeneration, taking into account the biological characteristics of logged timber species. Forest management that employs both RIL techniques and silvicultural operations to stimulate the growth and regeneration of desired species is required. This would be part of a strategy for forest-based sustainable development, which is of paramount importance for humanity.

Reduced impact, increased value: Good forest management practices reduce forest damage and carbon emissions and leave the forest in a better state to provide later harvests and perform environmental functions. *Photos: V. Medjibe*

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New fellowships awarded

The International Tropical Timber Council awarded 23 fellowships in its 2014 spring cycle. The awardees are from 15 different countries and include 13 females. The total value of the fellowships is US$148 385. The awardees are listed below.

Preparing technical documents: Mr Jean Didier Tèwogbadé Akpona (Benin)

Short training: Ms Camila Horiye Rodrigues (Brazil); Ms Agnès Kibongo Epse Ebanga (Cameroon); Ms Stella Ngeh Asaha (Cameroon); Mr Bouattenin Kouadio (Côte d'Ivoire); Ms Edith Abruquah (Ghana); Ms Harriet Ansaah Lartey (Ghana); Ing. Herless Arbey Martínez Recinos (Guatemala); Mr Pramod Kumar Yadav (India); Mr José David Bonilla Morales (Mexico); Ms Silvia Berenice Quintana Sagarnaga (Mexico); Ms Wai Wai Than (Myanmar)

Conferences and study tours: Mr Osei Asibe Asafu-Adjaye (Ghana); Dr Rashmi Ramesh Shanbhag (India); Ms Rinda Amalia Fadila (Indonesia); Ms Ivanna Febrissa (Indonesia); Dr Seca Gandaseca (Indonesia); Mr Azman A. Rahman (Malaysia)

Masters and PhD-related: Mr Victorin Houmenou (Benin); Mr Pheakkdey Nguon (Cambodia); Ms Mónica Orjuela Vásquez (Colombia); Ms Rebeca Auxiliadora Midence Cerdas (Costa Rica); Ms Catty Marisela Samaniego Arcos (Peru)

Fellowship report

Research into the use and conservation of forest timber species is the starting point for improving the livelihoods and well-being of local communities in the Amazon

by Luis Eduardo Rivera-Martin and María Cristina Peñuela-Mora

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Enriching: A seedling of quinilla (*Manilkara bidentata*), a valuable timber species, ready for planting in a secondary forest in the Amazon. *Photo: L. Rivera-Martin*

In the large and diverse Amazon region, there are many and varied ways in which to understand and manage the land and its natural resources. Indigenous and other local communities are generally selective in their forest use—in species, habitats and seasons—and historically their rates of extraction have been within the limits of the resources to recover. However, certain extractive practices are now undermining the social, cultural and economic stability of the people living in the region. A better balance is required between the modern use and conservation of natural resources (Lara and Vildes-Almonacid 2014).

Timber has been harvested commercially in Amazonia for 200 years. In Colombia, Cárdenas and López (2000) recorded 164 species with commercial potential, but only 20 of those are used currently in the market. The implementation of an adequate regime for the management, sustainable use and conservation of a timber species requires knowledge of that species' ecology and dynamics (Nebel and Meilby 2005). Existing traditional and scientific knowledge can be combined to improve resource management, and knowledge gaps can be identified.

In collaboration with local indigenous inhabitants, we undertook research into natural populations of three important Amazonian timber species: abarco (*Cariniana micrantha*), quinilla (*Manilkara bidentata*) and violeta (*Peltogyne paniculata*) at the Zafire Biological Station in the Colombian Amazon. We collected baseline data on the biology, ecology and forestry of these species in a 20-hectare plot established in 2005 and conducted germination trials in nearby natural and secondary forests. On the basis of our research, we proposed propagation protocols for the laboratory and the nursery.

Use and traditional knowledge of valuable species

The timbers of the three species are used in homebuilding and are highly prized. Poles of *M. bidentata* are valued for their strength and natural durability when in direct contact with the ground; the wood of *C. micrantha* is used for interior structural purposes; and *P. paniculata* is highly sought-after for the manufacture of utensils, flooring and interior finishes due to its brightness and colour. The three species also provide other products (Table 1): for example, *M. bidentata* produces balata (a latex); *C. micrantha* can be used as a rope fibre; and the inner wood of *P. paniculata* yields a dye.

Ecological characteristics

C. micrantha is an emergent species capable of achieving a diameter at breast height (dbh) in excess of 200 cm. It is found in upland forests in very low densities—for example, it occurs in the study area at a density of 0.4 individuals (dbh ≥ 10 cm) per hectare. A high-light-demanding species, *C. micrantha* grows at an average of 0.32 cm dbh per year (Peñuela-Mora et al. unpublished). The population structure in the study area comprises a high proportion of adult individuals relative to early regeneration stages. *C. micrantha* has a clustered diameter-class distribution because it requires large gaps to establish successfully, and these occur only rarely in natural forests. The species relies on abundant flowering and effective wind dispersal mechanisms for reproductive success.

M. bidentata is a medium-sized (dbh up to 0.8 m) canopy species inhabiting *terra firme* and flooded forests in the Amazon. A shade-tolerant species, *M. bidentata* grows

Table 1: Uses of *C. micrantha*, *M. bidentata* and *P. paniculata*

Use category	Abarco (*Cariniana micrantha*)	Quinilla (*Manilkara bidentata*)	Violeta (*Peltogyne paniculata*)
Food	Seed	Fruit	-
Artisanal handicrafts	Fruit	Latex	Heartwood
Heavy carpentry	Heartwood	Heartwood	Heartwood
Homebuilding	Heartwood	Heartwood	Heartwood
Cultural	Bark	Latex	Heartwood
Medicinal	Bark	Bark	-
Dye	-	-	Heartwood
Industrial	-	Latex	-

more slowly than *C. micrantha*, at an average of 0.14 cm dbh per year (Peñuela-Mora et al. undated); it can take more than 500 years to attain a dbh of 80 cm. The species occurs in relatively low densities (e.g. 1.2 individuals of dbh ≥ 10 cm per hectare in the study area).

The diameter-class distribution of the *M. bidentata* population in the study area is an inverted "J", with high levels of natural regeneration. This structure enables the replacement of adult individuals by any number of individuals at various regeneration stages; this constant recruitment helps maintain stability in the population. The species achieves reproductive success from the abundant production of fleshy fruits that are highly palatable to animals, which facilitates their dispersion and the establishment of seedlings in variable light conditions.

P. paniculata is an emergent species that occurs in upland forests at very low densities (0.15 individuals per hectare with dbh ≥ 10 cm in the study area). It has intermediate shade tolerance because it requires forest gaps to reach the adult stage. The diameter-class distribution indicates a clear majority of adult individuals compared with juveniles, which are scarce. Natural regeneration is limited mainly by the very low availability of seed sources, large pre-dispersal damage, limited dispersion capacity and physical seed dormancy.

How to conserve and manage populations

The intensity of harvesting and the time between cutting cycles should be based on reliable information on population density and structure and species' growth rates; harvesting must be low-impact, and appropriate silvicultural treatments must be applied to ensure the adequate regeneration and growth of future harvest trees. Supplementary enrichment planting is likely to be required for *P. paniculata* and *C. micrantha*. Seedlings of the studied species can be propagated or collected from natural seed banks and transplanted into areas where natural regeneration is inadequate, including on log landings and skid trails.

The area of secondary forests in the Amazon has expanded over time; these are potentially useful areas for conservation and sustainable-use strategies. Our study proposes techniques and guidelines for the establishment, survival, growth and quality of the three species in such forests. Enrichment-planting lines involving these species (pure and mixed) have achieved good results.

Other policy and regulatory activities that could contribute to the conservation of populations of the three species include:

- preventing the commercial exploitation of *P. paniculata* and *C. micrantha* in forests where the densities of adult trees are equal to or less than the densities found in the present study;
- determining the minimum required distance between potentially fertile individuals at which pollination, flowering, fruiting and dispersal are effective; and
- developing facilities to implement techniques for the artificial restocking or enrichment of forests under exploitation.

An urgent task is to correctly label standing trees and throughout the chain of custody to ensure traceability. It is also necessary to increase awareness among forest users that forest resources are finite and therefore should not be wasted. It is important to promote the restoration of natural forests and to restore populations of exploited species through such practices as enrichment planting and other silvicultural measures to ensure income in the short, medium and long terms.

Conclusion

The agencies responsible for forest conservation and management face huge challenges in providing training for, and increasing the awareness of, local people, loggers and officials on the requirements of sustainable forest management. Knowledge of the ecology and silviculture of Amazonian timber species, and the application of that knowledge in the field, is essential for ensuring sustainability.

The proper implementation and monitoring of various field experiments and forest management practices by forest users and government entities is a great opportunity to generate knowledge on the technical, financial and environmental sustainability of management plans and approaches for the conservation of timber resources that are agreeable to all parties. It is also possible to generate evidence on the vulnerability of some populations, thereby assisting agencies in determining whether to grant or deny logging permits.

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This article is drawn from *Ecología y silvicultura de especies útiles Amazónicas: abarco (*Cariniana micrantha *Ducke), quinilla (*Manilkara bidentata *(A. DC.) A. Chev.) y violeta (*Peltogyne paniculata *Benth.)*, which can be obtained at: www.bdigital.unal.edu.co/cgi/users/home?screen=EPrint%3A%3AView&eprintid=36632

Market trends

Prospects brighten for tropical timber producers

Compiled from information contained in ITTO's Market Information Service reports www.itto.int/market_information_service

The economic indicators have moved into positive territory in most traditional tropical timber markets, with encouraging signals that the worst of the downturn is over in the European Union (EU) and the United States (US).

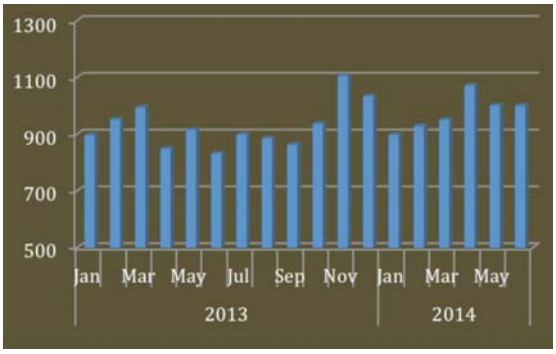
Prices for tropical timber exports improved in the first half of 2014, with prices for commodity products such as logs and sawnwood reflecting firm demand in China and India. It is difficult to separate the influence of rising demand from declining tropical log availability, however.

Imports of plywood, flooring and furniture by the EU and US are showing firm signs of recovery, but further growth in the markets for such products depends very much on growth in housing construction and renovation, where the signals are mixed.

Housing

United States

Figure 1: Housing starts, US ('000 of units)



Source: US Census Bureau

Prospects for the US housing market improved considerably in the first six months of 2014 (Figure 1), although the US will continue to suffer a hangover from the bursting of its housing bubble for years to come. Home prices are almost back to pre-bubble levels, and the number of people having to give up their homes because they can't service their housing loans has fallen.

Significantly, there has been a rise in sales of existing homes (by 2.4% in July 2014), bringing projected annual housing starts in the US in 2014 to 5.15 million. The increase in sales comes on the heels of good news that the pace of single-family home construction continues to increase. Analysts caution, however, that the housing market remains fragile, with the pace of sales still below what it was in the first half of 2013.

European Union

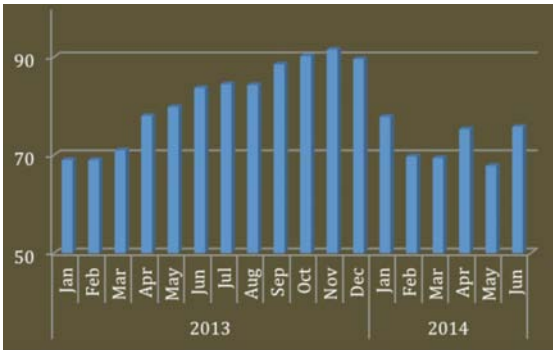
According to the latest half-yearly report issued by Euroconstruct, EU construction output fell in 2013 to its lowest level in 20 years. Nevertheless, growth of around 2% is forecast for construction in 2014 and through to 2016.

The pace of recovery projected by Euroconstruct is slow, suggesting that the construction sector will be stuck at near-depression levels for some time. High unemployment and debt, low investment, tight credit and financial fragmentation in the euro zone will continue to dampen demand.

In most European countries, house prices should stabilize this year as economic fundamentals improve, but a full recovery is still a long way off for those housing markets worst hit by the downturn, such as Spain and the Netherlands. The strongest rebound has been in the United Kingdom (UK), while house prices in Germany should remain steady.

Japan

Figure 2: Housing starts, Japan ('000 units)



Source: Japan Ministry of Land, Infrastructure, Transport and Tourism

Japan is the world's second-largest housing market, accounting for 10% of global housing investment. It is, therefore, a huge market for wood products. Its population is shrinking, however, and soon there will be fewer buyers in the market. The number of households is increasing for now but is projected to decline after 2015.

Housing starts in Japan began to grow when the Liberal Democratic Party was returned to power in 2012 with a massive parliamentary majority. Starts grew steadily between May and November 2013 (Figure 2) as home buyers scrambled to complete purchases before the consumption tax was raised from 5% to 8% in April 2014.

In its latest report, the Land Institute of Japan says that house prices have been rising steadily in 2014, following on from the housing market recovery last year. The average price of an existing detached house in Japan has increased by 2.4% since the beginning of the year.

Builders are finding that, while demand has slowed after the pre-tax increase boom, it is still at its strongest for more than five years, which analysts attribute to government reflationary policies. House prices are expected to continue rising in 2014, given that the government is expected to inject additional stimulus into the economy in the second half of the year.

China

Most analysts say that the Chinese housing market has moved beyond the days of double-digit annual growth but that there is still room for growth in this market.

China and India both import large volumes of commodity wood products (logs and, to a lesser extent, sawnwood),

and both countries are having major impacts on commodity wood product prices. The Chinese government has been steering manufacturing away from a reliance on export markets and creating an environment in which domestic consumption plays a bigger part in economic growth. Because of this fundamental change, developments in the housing market in China are having a greater impact on tropical timber imports.

Property sales account for 12–15% of China's gross domestic product (GDP), so a continued slowing in home sales (as indicated by data from China's National Bureau of Statistics) is a risk to the economy. Falling prices for homes and a decline in building have knock-on effects in other parts of the Chinese economy—such as construction worker wages, furniture demand and family expenditure.

India

It is estimated that, by 2020, India will need to build up to 50 million new homes, requiring an investment of US$100 billion annually, more than double the current level. The present urban housing shortage is said to be more than 18 million units, of which 95% is for low-income families.

With the new government already busy with plans for economic revival, there are high expectations in the housing sector that infrastructure deficiencies in the country will be addressed. This is essential if the housing sector is to contribute optimally to the economy.

The Indian real-estate sector has long campaigned to be recognized as an integral part of the infrastructure industry, not merely as a business. The real-estate sector will grow rapidly if the government can deliver on infrastructure. It currently contributes about 5% to national GDP, is the second-largest employer after the agricultural sector, and is growing at around 10% annually.

Imports

European Union

Plywood imports from Malaysia to the EU declined by 12%, to 53 300 m³, in the first six months of 2014, a turnaround from the 9% increase in 2013. The decline is explained by: rising prices due to an increase in Generalized System of Preferences duties, from 3.5% to 7%, on 1 January 2014; higher production and freight costs in 2014; and robust sales in other parts of the world.

The high prices for Malaysian plywood have affected demand in the relatively large but price-conscious UK market. Imports of Malaysian plywood into the main continental European markets have increased this year.

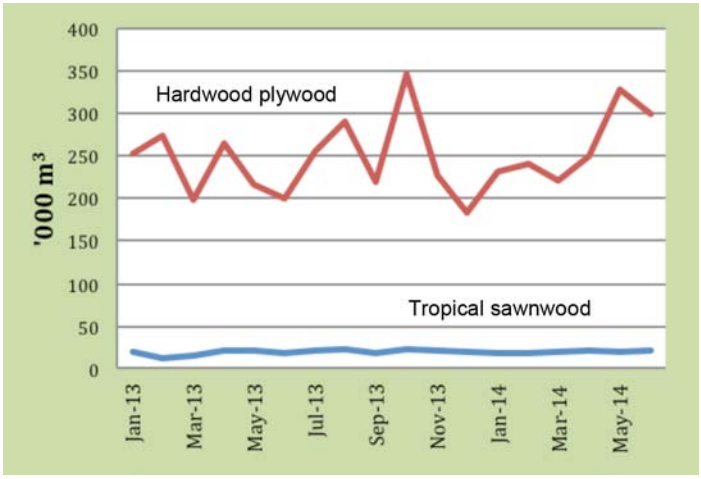
Imports of hardwood plywood from Indonesia were up by 5% in the first six months of 2014 following a decline in imports in 2013. Imports into Belgium declined by 25%, but this was offset by rising imports into Germany, Italy, the Netherlands and the UK.

Like Malaysian products, Indonesian plywood prices have risen this year. However, Southeast Asian plywood continues to benefit in the EU market from relatively high prices for competing Russian and European birch plywood.

EU imports of wooden furniture have been declining since the start of 2011. After peaking in 2010, imports from China have fallen, but the pace of decline in imports from other countries has been faster and China's share of overall EU wood-furniture imports has therefore risen from 49% to 54% since the start of 2010. Imports from Viet Nam have been relatively stable since 2010 and, as a result, the share from this country has also risen, from 9% to 11%. The share of imports has fallen from 8% to 6% for Indonesia and from 5% to 4% for Malaysia.

United States

Figure 3: Imports of tropical sawnwood and hardwood plywood, US



Source: US Department of Commerce, US Census Bureau, Foreign Trade Statistics

Year-to-date imports of hardwood plywood are slightly below those for the first half of 2013 (Figure 3). However, plywood imports from Indonesia were 38% higher in the first half of 2014 than in the corresponding period in 2013, and hardwood plywood imports from China also grew, by around 30%.

Although, overall, they are up by 9% in the first half of 2014, US imports of hardwood sawnwood fell by 50% in June, following a high point in May, when imports were over 150 000 m³. Tropical imports have increased gradually since the start of the year, while temperate sawn hardwood imports have fluctuated.

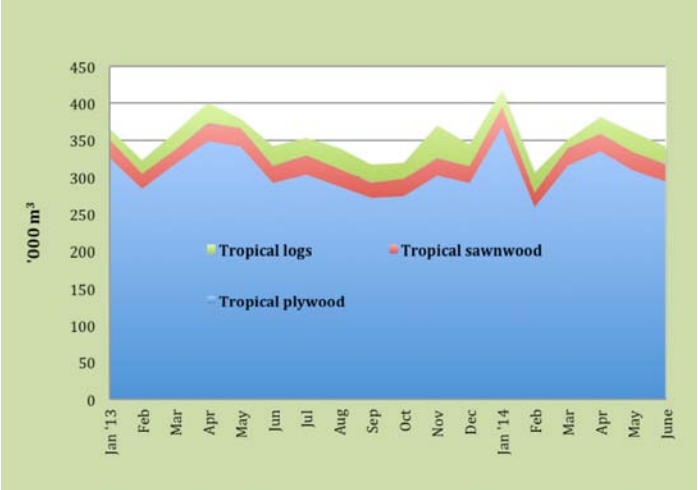
US demand for windows and doors of all materials is expected to grow by 7% per year to 2018. Demand will reach US$32.0 billion in 2018, up from US$22.8 billion in 2013. Plastic products are expected to take market share from both wood and metal and, of the three materials, wooden window frames and doors are forecast to have the slowest demand growth. Nevertheless, demand for those products is still expected to grow by 6.2% per year to 2018.

Japan

Japan's plywood imports have averaged around 3.5 million m³ per year since 2011, and they amounted to 1.88 million m³ in the first five months of 2014 (Figure 4).

Malaysia is the largest supplier of plywood to Japan, but the volume of 137 000 m³ shipped in the first five months of 2014 represented a decline of 8.5% year on year. Indonesia supplied 87 000 m³ in the first five months

Figure 4: Imports of tropical plywood, sawnwood and logs, Japan



Source: Japan Lumber reports

of 2014, also down (by 13%) over the same period in 2013. China's plywood shipments to Japan in the first five months amounted to 71 000 m³, a 7% decline.

Japan is no longer a major tropical log importer. In 2013, the country's log imports comprised 3.4 million m³ from North America, 0.6 million m³ from New Zealand, 0.25 million m³ from the Russian Federation and 0.3 million m³ from Southeast Asia (80% from Malaysia and the balance from Papua New Guinea and others).

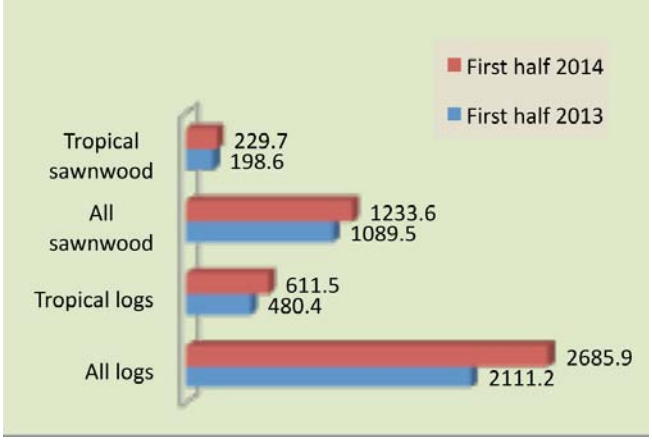
Japanese furniture imports have almost doubled in value in the last decade. Imports from China and Southeast Asia account for the largest proportion of furniture and parts, while higher-priced imports come mainly from the EU and North America.

China

The shift in China from an export-led timber trade to one aimed at the domestic market presents many challenges for Chinese timber companies and will be felt in the international timber trade. In the longer term it should lead to a wider range of wood-product imports. In the short term, however, the focus of Chinese importers will be on commodity wood products to feed domestic mills.

Chinese wood-product manufacturers are undergoing a transformation from low-value-added, obsolete production methods to processes using the latest technologies.

Figure 5: Imports of logs and sawnwood, China (10 000 m³)



Source: Chinese Academy of Science

The supply of timber from domestic resources in China has fallen by close to 20% per year for the past decade, a deficit which has been filled by imports from temperate and tropical countries.

The Russian Federation supplied around 50% of all logs to China until 2013. The imposition of export taxes in the Russian Federation, however, has seen the share of Russian log imports fall to below 10%. Nevertheless, the Russian Federation (along with Canada) still meets a major part of China's demand for sawnwood.

China's total log imports rose by 27% in the first half of 2014 compared with the same period in 2013 (Figure 5). Tropical log imports rose by 26%, total sawnwood imports rose by 13% and tropical sawnwood imports rose by 16%. China accounts for 15% of Brazil's sawnwood exports.

Explosion in demand for hongmu. Hongmu, or "rosewood", has a long history of use in China. In the Qing Dynasty, hongmu furniture and wooden utensils were highly prestigious, providing comfort and dignity as well as prestige. The Chinese domestic market for hongmu products grew steadily between 2001 to 2007, but demand erupted in 2008 and Chinese importers began sourcing a variety of rosewoods from around the world for sale as hongmu. Traditionally, hongmu refers to the heartwood of *Pterocarpus* spp., *Dalbergia* spp., *Millettia* spp. and *Cassia* spp., the density, texture and colour of which meet the requirements of the National Hongmu Standard. The smuggling of high-value rosewoods has become a serious problem for many tropical countries and, in response, the Chinese government has put systems in place to control and manage hongmu imports.

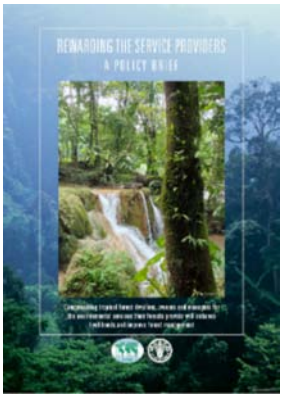
The EU Timber Regulation

More than a year has passed since the coming into force of the EU Timber Regulation (EUTR), which requires importers in the EU to demonstrate due diligence in their timber purchases to ensure that such timber has not been obtained illegally. There is no clear indication that the EUTR is having a negative impact on the trade, although it is still early days. One noticeable effect, however, has been to concentrate the trade in the hands of a few larger importers because smaller importers have found the costs involved too high. Instead of importing directly, therefore, they are purchasing their timber from larger importers, which are better equipped to handle the EUTR.

The European Timber Trade Federation and several national trade organizations are raising concerns about the inconsistent application of the EUTR across the EU and even within member states. Also of concern is the perceived lack of guidance on key elements, such as risk assessment, and the need for a greater focus on the commercial implications and evolution of cost-effective mechanisms for compliance.

Recent editions

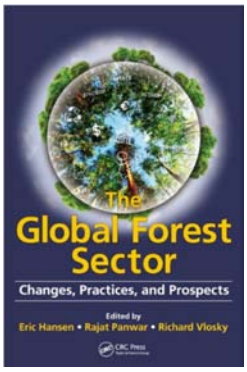
Compiled and edited by Ken Sato



ITTO, FAO and FONAFIFO 2104. *Rewarding the service providers: a policy brief*. Yokohama, Japan.

Available at: www.itto.int/policypapers_guidelines

The aim of this policy brief is to increase awareness among policymakers and the general public about the vital role of tropical forests in providing environmental services and the increasing need for beneficiaries to compensate forest owners and managers for those services. The brief builds on the insights gained at the International Forum on Payments for Environmental Services of Tropical Forests, which was held in San José, Costa Rica, in April 2014. It sets out the rationale for, and the constraints faced by, schemes for payments for environmental services, and key recommendations for scaling them up.



Hansen, E., Panwar, R. and Vlosky, R., eds. 2013. *The global forest sector: changes, practices, and prospects*. CRC Press, Boca Raton, USA, and London, UK.

ISBN (print): 978-1-4398-7927-6; ISBN (ebook): 978-1-4398-7928-3

Available at: www.crcpress.com/product/isbn/9781439879276

This book consolidates current knowledge on various business management themes in the forest sector. It aims to fill a gap in the current literature on forest product marketing and competitive strategy that is preventing students, scholars, policymakers and others from developing a timely, structured, big-picture view of forest-sector business. It provides a picture of the current and changing forest sector, including the state of forests, the nature of markets, newly emerged patterns of stakeholder impact, and the evolution of key business practices.

Hansen, E., Panwar, R. and Vlosky, R., eds. 2013. *Enhancing tree conservation and forest restoration in Africa: report of the regional workshop held in Entebbe, Uganda*. Botanic Gardens Conservation International, Richmond, UK.

Available from Kirsty Shaw at: kirsty.shaw@bgci.org or BGCI – Plants for the Planet, Descanso House, 199 Kew Road, Richmond, TW9 3AB, UK

This report is the output of a workshop that brought together 32 representatives from botanic gardens, international organizations, NGOs, national tree seed centers, national forestry services, universities and private companies, with a focus on Uganda, Kenya and Tanzania. The workshop provided an opportunity to exchange information on indigenous species, share knowledge, explore solutions to common challenges, and outline next steps for increasing forest restoration focused on indigenous species in East Africa and new partnerships for action.

Monge, G.A.N., Gutiérrez, O.J.S., Bolívar, L.C.V. and Quesada, V.M., eds. 2014. *Análisis del comercio internacional de productos de madera y su gobernanza administrativa Región de América Central y la República Dominicana 2000–2011*. IUCN Regional Office for Mexico, Central America and the Caribbean, San José, Costa Rica.

ISBN: 978-9968-938-61-7

Available at: www.iucn.org/news_homepage/news_by_date/?15997/comerciomaderaregion

This publication (available only in Spanish) analyzes the trade of timber products using official statistics, with corroboration in the field using data from customs, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, forest and phytosanitary authorities and private industry. The study assesses the potential use of trade statistics in timber traceability and legality verification systems.

ITTO fellowship applications—2015 spring cycle

ITTO offers fellowships to promote human resource development and strengthen professional tropical forestry and related expertise in member countries. The next deadline for applications is 20 February 2015 for proposed activities starting after 15 July 2015. To apply online, please visit www.itto.int/feature20 (online applications open from 15 November 2014), or contact Dr Chisato Aoki, Fellowship Coordinator, at: fellow-application@itto.int; fax +81–45–223 1111 (see page 2 for ITTO's postal address).

ITTO releases online project search tool

A searchable database increases the accessibility of ITTO project information

ITTO has developed an online project search tool with the aim of disseminating the knowledge it has gained through the implementation of more than 800 projects and pre-projects[1] since the Organization became operational in 1986.

The online project search tool provides public access to a database of all projects and pre-projects implemented with ITTO funding, as well as projects and pre-projects seeking financing. The database provides summaries of all projects and pre-projects. In addition, for those 500+ projects and pre-projects that have been completed since 2000 or are ongoing, the database provides access to project documents, completion reports, project technical reports, ex-post evaluation reports and promotional materials (e.g. posters, brochures and leaflets).

The project search tool allows searches by parameters such as project ID; keyword; country; donor; status (i.e. completed, operational or seeking finance); area of work (i.e. economics, statistics and markets; forest industry; and reforestation and forest management); and thematic programme.

The project search tool can be accessed at www.itto.int/project_search

1 The purpose of a pre-project is to facilitate the formulation of a project proposal.

Obituary

Yati Bun, executive director of the Foundation for People and Community Development in Papua New Guinea, died in February

Photo: Earth Negotiations Bulletin

Yati Bun was a founding member of ITTO's Civil Society Advisory Group, a frequent attendee at sessions of the International Tropical Timber Council, and a calm presence respected by all members of the Council. Yati was also executive director of the Foundation for People and Community Development (FPCD), a highly regarded non-governmental organization in Papua New Guinea (PNG) with core expertise in community-based forestry and forest certification.

Yati had strong beliefs about how forestry should be conducted in PNG. He believed that the customary resource owners (i.e. the communities who own the forests) should manage their forests and not hand over land and timber rights to outside developers. This brought him into disagreement with conventional forestry practice in his country, which was one of the reasons he left the PNG Forestry Authority after ten years of service there. Through his work with the FPCD he kept true to his vision of forestry by and for the people; it was a difficult path to follow, but he never strayed from it.

Yati was a founding member of the Forest Stewardship Council (FSC), and over the years he was instrumental in using FSC certification as a tool for improving forest management in PNG. He worked tirelessly to obtain an FSC group certificate for the FPCD's Indigenous Community Forestry scheme. When this was achieved, he argued that if communities could manage their forests according to the highest international sustainability principles, there was no excuse for logging companies not to do the same. Yati was one of the architects of the newly established FSC Permanent Indigenous Peoples' Committee.

Yati was a founder of the Rights and Resources Initiative (RRI) and served a term on RRI's board; the FPCD was one of RRI's first partners. Yati played a key role in shaping RRI's approach and programs and was always a positive, generous spirit and charming presence at their meetings.

Yati kept the door open to anyone wanting to work with him to improve forest management and the wellbeing of communities in his country. For example, the FPCD helped implement a private-sector/civil-society partnership (with funding from ITTO) to assist a forest company to take steps towards FSC certification in PNG's Western Province.

Yati was always welcoming and willing to help out in anyway he could. He supported many young foresters who worked with him to pursue higher education overseas, and he was always proud when they returned to PNG and took up new positions. Many other PNG foresters benefited from his guidance.

Yati was highly respected wherever he went—whether he was working with other likeminded people in international circles or with communities in his country, building their capacity to manage their forests wisely. He supported overseas volunteers and many others, and he worked closely with the Forestry Authority and progressive companies to raise the standard of forest management in PNG to a level where the country could take real pride in its forestry. Above all, Yati was a gentle man of principle and a great person to be around. He will be missed by many.

This obituary was written by Henry Scheyvens, with help from Chen Hin Keong, Alastair Sarre, Ramón Carrillo, Andy White and published sources.

ITTO Fellowship Network

ITTO has launched the ITTO Fellowship Network, a social media platform to facilitate interaction and knowledge-sharing among ITTO Fellows and alumni who have benefited from the ITTO Fellowship Programme. The Fellowship Network will:

- promote the sharing of knowledge and information among ITTO Fellows and alumni on the sustainable management and use of tropical forests and related issues;
- disseminate research papers, technical documents, books, etc., produced by ITTO and ITTO Fellows and alumni, including by allowing Fellows and alumni to upload their own work;
- provide a forum for collaborative work among ITTO Fellows and alumni;
- provide a platform for pursuing common interests, such as career development opportunities and networking; and
- provide up-to-date information on alumni activities and events worldwide.

The Fellowship Network is open to all. Join and share your experiences and publications to promote the sustainable management of tropical forests at: www.ittofellownet.org.

For more information contact: Dr Chisato Aoki, Fellowship Coordinator, at: fellownet@itto.int.

Meetings

5–11 October 2014
XXIV IUFRO World Congress: Sustaining Forests, Sustaining People: The Role of Research
Salt Lake City, United States
Contact: http://iufro2014.com

5–16 October 2014
12th Meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP 12)
Pyeongchang, Republic of Korea
Contact: www.cbd.int/cop

7–8 October 2014
Timber Expo
Birmingham, UK
Contact: www.timber-expo.co.uk

8–9 October 2014
Congo Basin Forests Partnership Anchor Conference
Brazzaville, Republic of the Congo
Contact Dany Pokem at: dany.pokem@pfbc-cbfp.org; http://ccr-rac.pfbc-cbfp.org/registration.html

9 October 2014
Tropical Forests: Connecting the World through Sustainability (ITTO–IUFRO Joint Side-event at XXIV IUFRO World Congress)
Salt Lake City, United States
Contact: itto@itto.int; www.itto.int/workshop_detail/id=4005

9 October 2014
ITTO and CITES: Collaboration to Sustain Tropical Tree Species (Side-event at XXIV IUFRO World Congress)
Salt Lake City, United States
Contact: itto@itto.int; http://www.itto.int/workshop_detail/id=4005

9–10 October 2014
6th National Forestry Symposium of Colombia
Medellin, Colombia
Contact: sforestal_med@unal.edu.co; www.unalmed.edu.co/~poboyca/simposio

13 October 2014
Achieving Forest-related Aichi Targets on the Ground: ITTO/CBD Collaborative Joint Initiative for Tropical Forest Biodiversity (ITTO–CBD–JICA Joint Side-event at CBD COP 12)
Pyeongchang, Republic of Korea
Contact: itto@itto.int; www.itto.int/workshop_detail/id=4059

14 October 2014 (tentative)
Aichi Biodiversity Target Task Force Meeting at CBD COP 12
Pyeongchang, Republic of Korea
Contact: www.cbd.int/doc/meetings/cop/cop-12/official/cop-12-12-en.pdf

15 October 2014 (tentative)
ITTO and CITES: Collaboration to Sustain Tropical Tree Species (Side-event at CBD COP 12)
Pyeongchang, Republic of Korea
Contact: rfm@itto.int; www.itto.int/workshop_detail/id=4061

14–16 October 2014
2nd Restoring Forests Congress: What Constitutes Success in the 21st Century?
Lafayette, Indiana, United States
Contact: www.purdue.edu/fnrrf

14–16 October 2014
XI Seminar on Remote Sensing and GIS applied to Forestry Engineering
Curitiba, Brazil
Contact: www.11sengef.com.br; lingnau@ufpr.br

16–18 October 2014
International Softwood Conference 2014
Berlin, Germany
Contact: www.isc2014.de

20–24 October 2014
VI Latin American Forest Congress: Latin America in Harmony with the Sustainability of the Forest Resources and the Environment
Michoacan, Mexico
Contact: conflat.mexico2014@gmail.com

28–31 October 2014
World Sustainable Building Conference 2014
Barcelona, Spain
Contact: www.wsb14barcelona.org/index.html; info@gbce.es

29–31 October 2014
2014 Forest Expo + Biodiversity + Technology + Productivity
Guadalajara, Mexico
Contact: www.expoforestal.gob.mx/portal/2014/informacion.html#

3–8 November 2014
50th Session of the International Tropical Timber Council and Associated Sessions of the Committees
Yokohama, Japan
Contact: itto@itto.int; www.itto.int

3–4 November 2014
7th International Woodfiber Resource and Trade Conference
Santiago, Chile
Contact: mariela.ferrari@pikecarbosur.com.uy; www.woodfibreconference.com

4–6 November 2014
2nd International Conference on Evaluating Climate Change and Development
Washington, DC, USA
Contact: www.climate-eval.org/events/2014-conference; climate-eval@climate-eval.org

12–19 November 2014
IUCN World Parks Congress
Sydney, Australia
Contact: http://worldparkscongress.org

13–15 November 2014
7th International Scientific and Technical Conference on Innovations in Forest Industry and Engineering Design
Yundola, Bulgaria
Contact: inno_conference@abv.bg; http://inno.ltu.bg

17 November 2014
Session on Innovative Institutional Arrangements Facilitating PA's Contribution to Food Security and Nutrition at the IUCN World Parks Congress
Sydney, Australia
Contact: http://worldparkscongress.org

18 November 2014
ITTO–FAO Joint Side-event on Payments for Environmental Services: an Innovative Way to Sustain Forests and people's Livelihoods in Protected Areas
Sydney, Australia
Contact: itto@itto.int www.itto.int/workshop_detail/id=4062

17–20 November 2014
PEFC Forest Certification Week 2014
Paris, France
Contact: development@pefc.org; http://pefc.org/pefc-week-2014

17–20 November 2014
ExpoBois
Paris, France
Contact: patricia.guerquin@comexposium.com; www.expobois.fr

26–28 November 2014
Natural Resources, Green Technology and Sustainable Development
Zagreb, Croatia
Contact: igork@sumins.hr; www.sumins.hr:8080/GREEN2014

1–12 December 2014
20th Session of the Conference of the Parties of the Conference of the Parties of the United Nations Framework Convention on Climate Change and 10th session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
Lima, Peru
Contact: http://unfccc.int/meetings/rio_conventions_calendar/items/2659.php

1–12 December 2014 (tentative)
ITTO–JICA–Peru Joint Side-event on Forest Governance for REDD+ and PES of Tropical Forest

6–7 December 2014 (tentative)
ITTO–CBD–FAO–IUCN–KFS Joint Discussion Forum at the 2nd Global Landscape Forum
Lima, Peru
Contact:rfm@itto.int
Side-events at UNFCCC COP 20

3–5 December 2014
VIII Latin American Symposium of Physiography
Santiago, Chile
Contact: hromero@uchilefau.cl; viiislagf.chile@gmail.com; http://viiisimposiogeografiafisica.uchilefau.cl

12–16 January 2015
Second Meeting of the Ad hoc Expert Group (AHEG2) on the International Arrangement on Forests
United Nations headquarters, New York, USA
Contact: www.un.org/esa/forests/adhoc.html

14–19 April 2015
Milan Furniture Show
Milan, Italy
Contact: www.cosmit.it/en

14–15 May 2015
11th Session of the United Nations Forum on Forests
New York, USA
Contact: unff@un.org; www.un.org/esa/forests

11–16 May 2015
3rd World Teak Conference: Strengthening Global Teak Resources and Markets for Sustainable Development
Guayaquil, Ecuador
Contact: xelizalde@asoteca.org.ec; www.teaknet.org

27 June–1 July 2015
10th World Bamboo Congress: Bamboo for a Greener Future
Damyang, Republic of Korea
Contact Susanne Lucas at: susannelucas@gmail.com; www.worldbamboocongress.org

19–23 August 2015
New Frontiers of Forest Economics: Forest Economics beyond the Perfectly Competitive Commodity Markets
Beijing, China
Contact: shashi.kant@utoronto.ca

7–11 September 2015
XIV World Forestry Congress
Durban, South Africa
Contact: WFC-XIV-Info@fao.org; www.fao.org/forestry/wfc