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Multiple-use forest management in the humid tropics

Opportunities and challenges for sustainable forest management

Cover photos:

Left: A woman and child collect fruits in the forest of the native community of Pueblo Nuevo del Caco, Ucayali, Peru (AIDER)
Top right: A team of chainsaw millers sit on a sawn log of ayous (*Triplochiton scleroxylon*) in a forest in Cameroon (G. Lescuyer)
Bottom right: Women make baskets using fibres harvested in a forest in the Lao People's Democratic Republic (J. Broadhead)

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Multiple-use forest management in the humid tropics

Opportunities and challenges for sustainable forest management

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Foreword

Societal demands on tropical forests at the local, national and global scales are profound and varied: the regulation of the hydrological cycle; the mitigation of global climate change; the provision of timber and non-timber products; food security; recreation; biodiversity conservation; cultural and spiritual values; livelihoods and employment; and many others. The Statement of Principles on Forests, made at the Earth Summit in 1992, affirmed that forests should be managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. Yet we still seem far from implementing a truly holistic, multiple-use approach to forest management, or achieving the lasting conservation of tropical forests.

Managing forests for multiple uses is a potential way of increasing the monetary value that communities, managers and owners – who are sometimes the same people – obtain from the forest resource. But knowledge of the techniques for managing the various forest products and services, and the availability of market opportunities for them, can differ greatly, and the capacity to implement multiple-use forest management is often low. Local communities face challenges in adjusting their traditional practices to implement forestry regulations, which are often drafted with little consideration of the multiple goods and services of forests or of local social and ecological issues. In many tropical countries, management approaches that optimize trade-offs among the various forest goods and services have traditionally been neglected, or else are not well known by managers and practitioners. Laws are usually drafted with narrow objectives, and they tend to undermine societal inclusion because of limited cross-sectoral dialogue.

In 1985 FAO published the book *Intensive multiple-use forest management in the tropics: analysis of case studies from India, Africa, Latin America and the Caribbean*, which made the still-valid point that "the burgeoning demands and the often high density of population make it necessary to develop intensive multiple-use management systems. This, however, requires a good knowledge of existing practices and their deficiencies in fulfilling different objectives".

After more than two decades, this paper, based on case studies in the Amazon Basin, the Congo Basin and Southeast Asia, and a Web-based survey, takes a fresh look at the reality of multiple-use forest management. It finds that some patterns are global but that there are also regional peculiarities. This review gives us new insights into how to improve multiple-use forest management plans and practices on the ground, and how to use the concept to promote stakeholder dialogue on a range of policy, institutional, technical and social issues.

While progress has been made since 1985, multiple-use forest management has not expanded as might have been hoped. This paper identifies opportunities to increase the uptake of multiple-use forest management, and some of the steps that can be taken. Governments have a key role to play in creating enabling

environments and by supporting forest managers to realize the benefits of adopting multiple-use management.

This paper is the product of a collaborative effort led by FAO and the Center for International Forestry Research. We hope it will help managers, researchers and policy-makers to overcome the challenges, and realize the opportunities, for implementing multiple-use forest management in the humid tropics.

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Acronyms

CbFM	community-based forest management
CCF	Certified Community Forestry (Papua New Guinea)
COPAL	Coopérative des Planteurs de la Lékié (Cameroon)
FAO	Food and Agriculture Organization of the United Nations
FMC	Forest Management Concept (Indonesia)
FMP	forest management plan
FMU	forest management unit
FPCD	Foundation for People and Community Development (Papua New Guinea)
FSC	Forest Stewardship Council
GDP	gross domestic product
INCRA	National Institute of Colonization and Agrarian Reform (Brazil)
ITTO	International Tropical Timber Organization
KPKKT	Kumpulan Pengurusan Kayu Kayan Terengganu Sdn. Bhd. (Malaysia)
MFM	multiple-use forest management
NGO	non-governmental organization
NTFP	non-timber forest product
PAE	projeto de assentamento agro-extrativista (Brazil)
PES	payments for ecosystem services
PFE	permanent forest estate
RDS	reserva de desenvolvimento sustentável (Brazil)
REDD+	reducing emissions from deforestation and forest degradation, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
RESEX	reserva extrativista (Brazil)
RIL	reduced impact logging
SFM	sustainable forest management
SIFORCO	Société Exploitation Forestière (Democratic Republic of the Congo)
SOC	state operating company (Viet Nam)
SODEFOR	Société de Développement Forestier (Democratic Republic of the Congo)
SUDECOR	Surigao Development Corporation (the Philippines)
SUFORD	Sustainable Forestry for Rural Development (Lao People's Democratic Republic)
TRC	Transformation Reef Cameroon

Executive summary

In this report, multiple-use forest management (MFM) is defined as the deliberate management of a particular forest area in a particular time period for various goods and services. Three regional assessments were carried out between 2009 and 2012 to identify and draw lessons from on-the-ground initiatives in MFM in the Amazon Basin, the Congo Basin and Southeast Asia. In all three regions, information was collected through interviews with country-based forestry experts, forest managers and technicians. A complementary, Web-based questionnaire was used to examine a range of variables in ongoing or completed MFM initiatives at the country level.

The regional assessments canvassed 46 MFM initiatives in 13 countries. This report provides an overview of forestry in those countries and the 46 initiatives, the constraints they face, and the opportunities for diversifying and integrating products and services in forest management units. The evidence, opinions and perceptions gathered through interviews and surveys indicate that the practical application of MFM is a complex and challenging task in the prevailing conditions.

There is wide variation in the forest area encompassed by the surveyed MFM initiatives, from 1 900 hectares to almost 1 million hectares in the Amazon Basin, from almost 11 000 hectares to more than 2.1 million hectares in Southeast Asia, and from 4 800 hectares to almost 200 000 hectares in the Congo Basin. The smaller areas are mostly forests managed by indigenous peoples or by associations of small-scale extractors.

Of the surveyed initiatives, timber production is the predominant primary objective, followed by the production of non-timber forest products. Other economic activities of importance in at least some of the surveyed MFM initiatives were fisheries, ecotourism, forest conservation, the production of fuelwood and charcoal, and ecosystem services.

In many of the countries analysed in this report and for certain categories of actor, MFM remains an interesting yet barely operational concept due to economic, technical and administrative constraints. Timber is still the only forest commodity with major lucrative markets, whose operation is based on a reliable body of technical knowledge, and which provides a significant contribution to national economies. The dominant model of timber harvesting is, however, being undermined in some regions by the arrival of investors interested in agro-industrial or mining projects, for which the financial benefits can be much higher than those associated with sustainable timber harvesting. In this new context, MFM could increase the economic benefits of SFM. Several initiatives, such as certification and legality schemes, could help support the implementation of MFM, although generally forest management certification has so far failed to yield significant increases in timber prices.

Forest managers should be supported in efforts to realize the potential of MFM. Greater effort is needed to eliminate unfair competition from operators whose sole

objective is to extract timber, with little or no concern for multiple uses. In most countries, the demarcation of a permanent forest estate and the development of national land-use plans would increase investment in long-term forest management and lend support to MFM. Improving the value of logged-over forest through silvicultural treatments would improve the chance of those forests being managed for multiple uses. Training and awareness-raising to change the entrenched mindsets of certain forestry stakeholders is also recommended.

1 Introduction

Natural forests across the tropics provide a wide range of products, ecosystem services and social and economic opportunities and can potentially be managed to meet multiple objectives. The multiple-value nature of forests has long been appreciated and used by forest-dependent people in the tropics and the goal of multiple-use forest management (MFM) is stated in the laws of many countries, in much the same way as the guiding principles of sustainable forest management (SFM) became entrenched in laws following the Rio Earth Summit in 1992.

In the past, very low population densities and limited demand for products permitted the realization of multiple benefits from humid tropical forests (usually called tropical rainforests) without conscious effort (FAO, 1984). However, MFM is formally re-emerging in tropical rainforest policies because of the many demands being placed on those ecosystems. Tropical rainforests play important roles as globally significant reservoirs of carbon, sources of economically important products, and providers of essential ecosystem services and biodiversity. García-Fernández, Ruiz-Perez and Wunder (2008) considered MFM for timber, non-timber forest products (NTFPs) and the provision of ecosystem services to be:

"*a more equitable strategy of satisfying the demands from multiple stakeholders, an ecologically more benign harvesting approach, and a way of adding more value to forests making them more robust to conversion. MFM represents a common and prime management objective under the sustainable forest management paradigm*".

As landowners and forest managers in the humid tropics begin to consider MFM as part of their regimes, an assessment of existing MFM initiatives would assist them to make informed decisions in formulating forest management plans (FMPs) for multiple uses.

DEFINING MFM

The conceptual and practical development of MFM started in North America and Europe. Nix (2012) referred to it as:

"*the management of land or forest for more than one purpose, such as wood production, water quality, wildlife, recreation, aesthetics, or clean air*". It is "*a concept of forest management that combines two or more objectives, such as production of wood or wood-derivative products, forage and browse for domestic livestock, proper environmental conditions for wildlife, landscape effects, protection against floods and erosion, recreation, and protection of water supplies*".

But MFM models can also be found as part of longstanding practices in the tropics, for example in India and the sacred forests described in the *aranyakas*. Likewise, the spatial separation of forest use was practised in British India and Malaya from the late 1890s (Rawat *et al.*, 2011). Yet there is little agreement among stakeholders on the scope and definition of MFM. The proliferation of

associated terms, such as multiple-use, multipurpose, multifunctional, diversified and integrated forest management, contributes to the differing ways in which MFM is defined and perceived.

According to some, the multiple demands on forests can best be met at the landscape level by spatially segregating production and conservation objectives, with forest units specialized in single dominant uses such as the production of timber and NTFPs, ecotourism and ecosystem services (Vincent and Binkley, 1993; Binkley, 1997; Boscolo, 2000; Zhang, 2005). Others argue that multiple goods and services can be produced efficiently within individual management units or at the "stand level" (Panayotou and Ashton, 1992; Campos, Finegan and Villalobos, 2001). Thus, MFM may be accomplished by one or a combination of the following (Ridd, 1965):

- the concurrent and continuous use of several forest resources obtainable in a forest management unit (FMU), requiring the concurrent provision of several goods and/or ecosystem services from the same area (e.g. combining the extraction of rattan with wildlife conservation);
- alternating or rotating the use of various resources or product combinations in a unit (e.g. through shifting cultivation);
- the geographic separation of uses or use combinations so that multiple use is accomplished across a mosaic of units, with each FMU being put to the single use to which it is most suited (e.g. zoning of a forest area).

However, the working definition of MFM used in this document is the deliberate management of a particular forest area in a particular time period for various goods and services. This definition implies the diversification of uses in spatial and temporal terms and emphasizes both diversification and integration at the stand level.

REASONS FOR THE POOR IMPLEMENTATION OF MFM AT THE STAND LEVEL

Although MFM is envisioned increasingly as a viable alternative to a singular focus on timber production in tropical forests, assessing the relative economic value of and level of demand for various forest products and services is difficult because many such services are non-market commodities or have undeveloped markets. Most forest products, including timber, fuelwood and a wide range of NTFPs, are either traded or are tradable in markets and are also used for subsistence. Markets for ecosystem services, such as ecotourism, water and soil protection, biodiversity conservation and carbon sequestration, on the other hand, are still in their infancy (de Jong *et al.*, 2010a).

According to García-Fernández, Ruiz-Perez and Wunder (2008), MFM "within the same tropical forest-stand unit may only be implementable under exceptional circumstances". The key challenges range from:

"*intricate technical trade-offs at the species level to the economies of scale in forestry planning, production and marketing, and further on to the structural conditions in capitalist societies favoring commodity specialization models ... MFM remains a valid management alternative under specifically favorable local context conditions, especially when practiced at the landscape scale*".

The reasons for the perceived inefficiency of MFM at the stand level in tropical countries include the high fixed cost of forest operations (infrastructure planning, inventories, mapping, etc.) and the technical complexities of MFM (e.g. there is a lack of silvicultural knowledge and expertise to integrate the management of multiple products). When the influence of these aspects is reduced (e.g. in logged-over forests with lower fixed costs associated with re-harvesting, and community forestry at smaller scales with less need for infrastructure), multiple uses within the same management unit may yield superior returns to land-use specialization. Nevertheless, there is still a lack of understanding of why MFM approaches are not widespread.

WHY IS MFM IMPORTANT?

Increased societal demands on forests for timber and non-timber products and ecosystem services and rising environmental and social awareness about tropical forests are globally important trends affecting tropical forest use. Under the right conditions, MFM could diversify forest use, broaden forest productivity and provide incentives for maintaining forest cover. It could also allow a greater number of stakeholders to receive forest benefits. In addition, developing workable MFM approaches could provide opportunities to reduce social conflict and exclusion in remaining forest areas, as well as help reduce forest resource degradation and assist in establishing REDD+ programmes.[1] Risk reduction is another important reason to pursue MFM, and this is becoming more significant as the risks associated with climate change increase.

OBJECTIVES

The objectives of this report are to:

- systematize relevant past and ongoing initiatives in MFM in the tropics;
- increase understanding of the barriers that hinder the implementation and viability of MFM initiatives;
- make strategic recommendations to increase the chances of success of MFM initiatives under various environmental and socio-economic scenarios.

Geographically, the focus of this report is on three regions in the humid tropics: the Amazon Basin in South America; the Congo Basin in Africa; and Southeast Asia. By identifying and surveying MFM initiatives in these regions (Figure 1), the report aims to provide information relevant to the following questions:

- Under what circumstances can MFM be implemented successfully at the FMU level?
- Under what conditions can MFM be financially attractive and competitive with other land uses?
- What policy, technological and capacity-building strategies and interventions are needed to help forest managers overcome barriers to the successful implementation of MFM?
- What policy, institutional and market-based incentives could be devised to promote MFM?

1 REDD+ is a term used for efforts to reduce greenhouse gas emissions from deforestation and forest degradation, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.

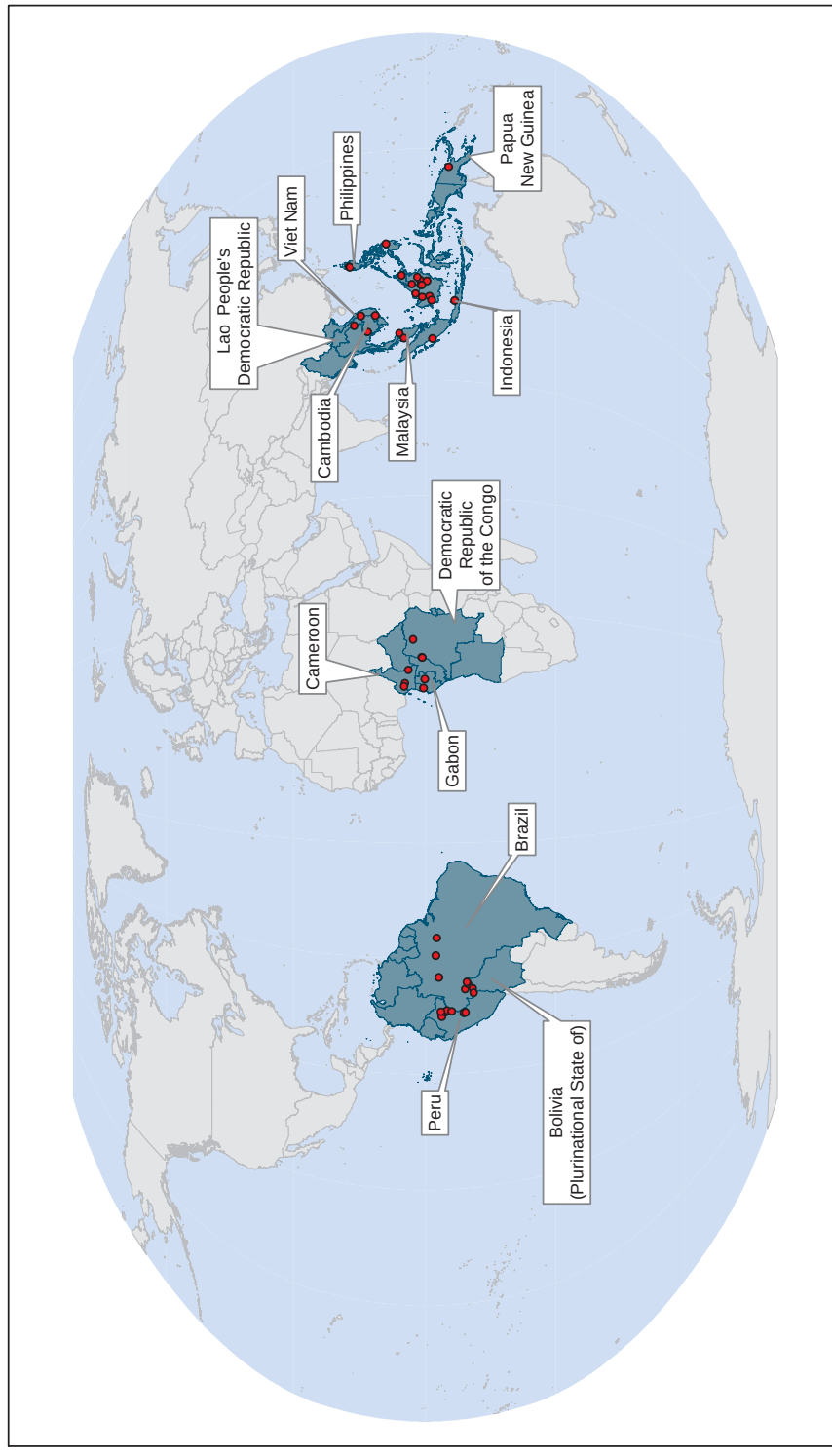


FIGURE 1
Location of identified MFM initiatives in the three tropical rainforest regions

2 Methodology

Two complementary approaches comprise this review: regional assessments of MFM, and a global survey conducted using a Web-based survey technique. Both are described below.

REGIONAL ASSESSMENTS

Three regional assessments were carried out between 2009 and 2012 to identify and draw lessons from on-the-ground MFM initiatives in the Amazon Basin (Sabogal and Almeida, 2009), the Congo Basin (Essoungou and Lescuyer, 2010) and Southeast Asia (Broadhead, 2012).

Two key questions were addressed in the assessment:

- What MFM initiatives are currently in place?
- What are the main constraints and the ecological, social, institutional, economic and forest policy/regulation drivers for the implementation of functional MFM systems?

In the Amazon Basin, the assessment focused on three countries[2]: Bolivia (Plurinational State of), Brazil and Peru. In the Congo Basin, the assessment comprised Cameroon, the Democratic Republic of the Congo and Gabon. In Southeast Asia, the assessment included relevant past and ongoing MFM initiatives in seven countries: Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Papua New Guinea, the Philippines and Viet Nam. In all three regions, information was collected using semi-structured interviews of country-based forestry experts, forest managers and technicians, including in national and international organizations. Information searches were conducted on the Web and in relevant printed publications. Information was collected on the size and location of MFM initiatives, the forest type and condition, forest tenure and responsibility for forest management, forest management details such as objectives and outputs, and constraints in establishing and maintaining MFM. Annex 1 shows the format of the information collected and the variables used in the assessments.

GLOBAL ELECTRONIC SURVEY

Although comprehensive, the three regional assessments had differences in scope and depth. For this reason, a complementary, Web-based questionnaire using the Survey Monkey tool[3] was designed to look at the following variables in either ongoing or completed MFM initiatives at the country level: driving forces and enabling conditions; barriers and opportunities; and recommendations to promote

2 Ecuador was originally considered as well but was omitted because interviews with national forestry experts and searches of the printed literature and the Web were unable to identify suitable MFM initiatives.

3 www.surveymonkey.com

MFM. The sampling universe considered the experiences, views and perceptions of a variety of managers and stakeholders (e.g. representatives of communities, researchers, non-governmental organizations – NGOs – and the private sector) directly or indirectly involved in MFM initiatives in the three regions. Respondents were identified using various forestry-related list servers and contacted by email. The survey was open for two months in the period March–May 2011.

The questionnaire used in the survey (Annex 2) had three sections: general information on the MFM initiative, such as information about land tenure and management; information on the barriers to MFM, and recommendations for increasing the success of MFM initiatives; and background information on the respondent. To examine the barriers hindering MFM, 22 economic, technical, sociocultural, institutional and policy-related variables were selected (Annex 3). Respondents were asked to rate the strength of each variable according to the following scale: strong barrier; moderate barrier; somewhat a barrier; and not a barrier. The options "don't know" and "not relevant to my initiative" were also available for each question.

3 Regional assessments

OVERVIEW

The following brief description of the forests and forest management situation in the Amazon Basin, the Congo Basin, and Southeast Asia is based on FAO (2010a). The total forest area in these regions is more than 1.3 billion hectares (Table 1), which is one-third of the global forest area. Forests cover 57 percent of the total land area, compared with the world average of 31 percent. The three most forest-rich countries (Brazil, the Democratic Republic of the Congo and Indonesia) account for more than half (57 percent) of the total forest area in the three regions. Table 2 presents data on the forest areas of the surveyed countries.

TABLE 1
Forest area, by country, Amazon Basin, Congo Basin and Southeast Asia

Amazon Basin	Congo Basin	Southeast Asia
Bolivia (Plurinational State of)	Angola	Brunei Darussalam
Brazil	Burundi	**Cambodia**
Colombia	**Cameroon**	**Indonesia**
Ecuador	Central African Republic	**Lao People's Democratic Republic**
French Guiana	Republic of the Congo	**Malaysia**
Guyana	**Democratic Republic of the Congo**	Myanmar
Peru	Equatorial Guinea	**Papua New Guinea**
Suriname	**Gabon**	**Philippines**
Venezuela (Bolivarian Republic of)	Rwanda	Singapore
	Sao Tome and Principe	Thailand
		Viet Nam
Forest area ('000 ha) and percent of land area (in brackets)		
799 394 (60)	301 807 (57)	242 048 (51)
Area of forest primarily designated for the production of wood and non-wood forest products ('000 ha) and percent of land area (in brackets)		
108 258 (14)	58 884 (20)	111 411 (46)
Area of forest with a management plan ('000 ha) and percent of land area (in brackets)		
75 496 (9)	30 820 (10)	59 666 (28)
Area of certified forest ('000 ha) and percent of land area (in brackets)		
5 416 (0.7)	4 483 (1.9)	6 367 (3.0)

Note: Countries with MFM initiatives included in the regional assessments are shown in bold.
Source: FAO (2010a)

TABLE 2
Forest parameters in countries with MFM initiatives identified in the regional assessments

Country	Forest area ('000 ha)	% of land area	Annual change rate 2000–2010		Publicly owned (%)	PFE (%)	Area with FMP (%)	Certified forest area (%)	Area under SFM (%)
			('000 ha/yr)	%					
Amazon Basin									
Bolivia (Plurinational state of)	57 196	53	-290	-0.49	100	67	23	3	8
Brazil	519 522	62	-2 642	-0.49	81	60	4	1	1
Peru	67 992	53	-122	-0.18	62	56	28	1	5
Congo Basin									
Cameroon	19 916	42	-220	-1.04	100	64	36	4	13
Democratic Republic of the Congo	154 135	68	-311	-0.20	100	31	5	0	0
Gabon	22 000	85	0	0	100	61	21	9	17
Southeast Asia									
Cambodia	10 094	57	-145	-1.33	100	82	16	0	0
Indonesia	94 432	52	-498	-0.51	91	70	19	1	5
Lao People's Democratic Republic	15 751	68	-78	-0.48	100	-	-	-	-
Malaysia	20 456	62	-114	-0.54	98	68	69	26	47
Papua New Guinea	28 726	63	-141	-0.48	3	36	3	n.s.	1
Philippines	7 665	26	55	0.74	85	79	28	0	1
Viet Nam	13 797	44	207	1.64	72	-	-	-	-

Note: ns = not significant.
Source: FAO (2011)

Forest characteristics

Two-thirds of forests in the three regions are classified as dense humid forests. The three regions also contain important areas of flooded forests (including mangroves) and some tropical dry forests.[4] Around one-fifth of all forests are classified as mosaics – mixtures of forest and other land, where forest patches are fragmented and difficult to classify separately.[5] Primary forests and other naturally regenerated forests predominate, constituting 98 percent of all forests. The average volume of carbon stored in forests in the three regions (202 tonnes per hectare) is higher than the global forest average (162 tonnes per hectare).

Ownership and management rights

Despite changes in forest ownership and tenure in some countries, the vast majority of forests in the three regions remain under state ownership, although the situation varies between regions and countries. In the Congo Basin, 99 percent of all forests are publicly owned, while close to 20 percent is privately owned in the Amazon Basin and Southeast Asia. In some countries there is a trend towards involving communities and private companies in the management of publicly owned forests. Brazil and the Philippines report that a large proportion of publicly owned forests is managed by communities (37 percent and 47 percent, respectively), while more than 40 percent of publicly owned forests are managed by private corporations and institutions in Cameroon, the Democratic Republic of the Congo and Indonesia (FAO, 2011). In the Amazon Basin, private corporations and institutions do not manage much public forest, although this is expected to change in Brazil as a result of the 2006 forest concession law (e.g. Banerjee and Alavalapati, 2008).

Socio-economic aspects

In total, forestry activities and the wood and pulp and paper industries contributed 2 percent of gross domestic product (GDP) in the three regions in 2006, but the contribution was significantly higher in some countries (notably 11.1 percent in the Central African Republic, 6.7 percent in Papua New Guinea and 4.1 percent in Guyana). In general, the size of the forest sector is decreasing as a percentage of GDP because other sectors are growing faster. Given the lack of data on the subsistence use of forests and on the informal economy, however, the total contribution of the forest sector to economies is undoubtedly higher than the official figure in many countries.

In the Congo Basin in 2006, forestry and logging contributed more than 80 percent of value-added in the forest sector and the pulp and paper industry only 1 percent. In Southeast Asia in 2006, forestry and logging contributed less

4 Dense dry tropical forests are particularly important in the Congo Basin, where they represent 23 percent of the total forest area (compared with 5 percent in the Amazon Basin and 6 percent in Southeast Asia).

5 Southeast Asia has the largest percentage (33 percent) of mosaic forests, compared with 18 percent and 15 percent in the Amazon Basin and the Congo Basin, respectively.

than 40 percent of value-added; 34 percent of value-added derived from the wood products industry and 27 percent derived from the pulp and paper industry (FAO 2011). The situation in the Amazon Basin is somewhere in between. In 2011, an estimated 2.3 million people were formally employed in the forest sector in all three regions combined – almost 1.2 million in the Amazon Basin, around 1 million in Asia and only 57 000 in the Congo Basin.

Status of forest management

The forests of the three regions are increasingly being conserved and managed for multiple uses and values, often in combination. Close to 279 million hectares (21 percent of forests) are managed primarily for the production of timber and NTFPs in the three regions (Table 2). Around 135 million hectares, or 10 percent of all forests, are designated for multiple-use, defined as forest "managed for any combination of goods production, soil and water protection, biodiversity conservation and social services provision, with none of these alone considered predominant". Eleven percent of the total forest area is designated for multiple-use in the Amazon Basin, 10 percent in the Congo Basin and 6 percent in Southeast Asia (FAO, 2010a).

Southeast Asia reported the largest proportion of forests designated for productive purposes, reflecting the high population density in the region and the long history of forest management and timber harvesting; that region had a low proportion of primary forest compared with the other two regions. However, Southeast Asia also recorded the highest proportion of forests designated for the protection of soil and water resources and for biodiversity conservation. The Amazon Basin had the highest proportion of forests managed for social services (largely in the form of areas allocated to indigenous people in Brazil) and aimed at helping to conserve cultural values (FAO, 2010a).

The area of forest covered by management plans is increasing, although data are unavailable for several countries in the three regions. Based on the most recent available information, close to 166 million hectares, or 13 percent of the forest area in the reporting countries, are under some kind of management plan. Countries in the Amazon and Congo basins reported than an average of 10 percent or less of their forests were covered by management plans, while 28 percent of all forests in the reporting countries in Southeast Asia had management plans (FAO, 2010a).

As of 2010, some 16 million hectares of forest in the three rainforest regions had been certified, amounting to 1.3 percent of the total forest area, ranging from 0.7 percent of the forest area in the Amazon Basin to 3 percent in Southeast Asia. However, information is missing for some countries, so the total certified area may be larger. FAO (2010a) reported that only 3.5 percent (or 44 million hectares) of the total forest area was considered to be under sustainable management.[6]

6 Based on information received from 23 of the 30 countries that applied fairly strict assessment criteria of SFM.

AMAZON BASIN

The Amazon Basin is a region of great contrasts – topographically, environmentally, socioculturally, economically, politically and institutionally.[7] The region covers 650 million hectares, of which about 550 million hectares are forested. The forested part of the Amazon Basin spans nine countries: Bolivia (Plurinational State of), Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela (Bolivarian Republic of) (UNEP, 2009). The population of the "greater Amazon"[8] is estimated at 33.5 million inhabitants, of whom 21 million live in cities (UNEP, 2009). The Amazon forests hold a huge store of carbon, and their destruction produces large amounts of greenhouse gas emissions. The Amazon forests also constitute a repository of biodiversity of global significance, as well as other important above-ground and below-ground natural resources, such as minerals and fossil fuels.

The diverse ecosystem services provided by Amazonian forests are of high regional and global importance (e.g. WWF Netherlands, 2009; Porro, Börner and Jarvis, 2008; UNEP, 2009).

The Amazon Basin contains the world's largest contiguous area of tropical forest, but it has also lost the largest area of forest of the three tropical regions. FAO (2005a) reported that about 3.5 million hectares of land per year was deforested in the Amazon countries in the decade 1990–2000, increasing to 4 million hectares per year in 2000–2005. Skole and Chomentowski (1994) reported that 30 percent of the deforested area in the Amazon was regenerating into secondary forest.

Forest policy and institutions

Governments have significantly improved the legal and institutional frameworks that deal with land and forest use in Amazonia since the 1990s (UNEP, 2009). These reforms, however, continue to give priority to the timber sector and to favour logging entrepreneurs. Only in the last decade have land and forest policies begun to consider the needs of small-scale farmers; communities, for example, have been encouraged to participate in logging activities. However, the policies and laws that regulate community forests tend to overlie models implemented by commercial enterprises without considering the specific characteristics of rural communities.

While law enforcement is often minimal, law compliance also tends to be low because the costs of complying render many forest enterprises unprofitable. This is especially the case for indigenous and community groups, who rarely benefit from opportunities under existing legal and policy provisions (Pokorny *et al.*, 2010). As a result, informal approaches tend to be more efficient in regulating social and economic interactions among forest users (Ruiz, 2005).

Commercial and communal forestry are both affected by macro-economic factors and policies. For example, exchange-rate policies have a direct effect on the competitiveness of timber exports; monetary policies influence the national

7 This section is adapted from De Jong *et al.* (2011).

8 The greater Amazon is the maximum extent of the Amazonian area based on at least one hydrographic, ecological or political/administrative criterion (UNEP, 2009).

consumption of forest products (which is important in Brazil, for example, with its high domestic timber consumption); and tax policies have a direct influence on community forestry because they affect product prices and profit margins (Pokorny *et al.*, 2008).

In the last two decades, nearly all Amazonian countries have profoundly revised their legal frameworks for the protection and sustainable use of natural resources, particularly forests. Initially, reforms focused on defining norms for the development, implementation and auditing of the FMPs of commercial timber enterprises, for the first time providing a clear and transparent basis for management and control. Later, governments also started to consider simplified regulations and norms for forest use by communities and individual families, although still focused primarily on timber harvesting. Local forest management schemes and the collection of NTFPs remain widely ignored in most legal frameworks. Most countries have chosen timber concession schemes as their governance approach and have set up detailed operational frameworks for authorization, auditing and control (De Jong *et al.*, 2010b).

Overview of the forest situation in target countries[9]

Bolivia (Plurinational State of)

- The permanent forest estate (PFE)[10] of Bolivia (Plurinational State of) is estimated at 38.3 million hectares, comprising 25.1 million hectares of natural production forest, 13.1 million hectares of protection forest and 73 000 hectares of planted forest.
- Logging is performed by various types of users (forest concessionaires, indigenous and peasant communities and private landowners) through FMPs approved by the forest authority (*Autoridad de Fiscalización y Control Social de Bosques y Tierras*). Most harvesting operations are performed by a variety of local community-based and indigenous institutions, which lack sufficient resources and capacity.
- A portion of forests is publicly owned and other forests are on lands that have been granted as private individual landholdings or as collective rights to indigenous people and agro-extractive communities. The area of forest in the hands of communities, mainly indigenous people, has grown because of the formalization of indigenous community lands (*tierras comunitarias de origen*). It is estimated that 8.7 million hectares of forest (about 30 percent of the PFE) is controlled by indigenous people.
- In 2005, Bolivia (Plurinational State of) had the largest area of certified natural tropical forest in Latin America. As of September 2010, there were 20 certified FMUs covering a total area of 1.72 million hectares. This is also

9 This section is based mainly on Blaser *et al.* (2011).

10 "Land, whether public or private, secured by law and kept under permanent forest cover. This includes land for the production of timber and other forest products, for the protection of soil and water, and for the conservation of biological diversity, as well as land intended to fulfil a combination of these functions" (ITTO, 2005).

the area recognized as being under SFM.
- Brazil nut (*Bertholletia excelsa*, locally called *castaña*) is by far the most important NTFP exported. Palm hearts (*Euterpe precatoria*, locally called *palmito*) are harvested mostly in private forests and are subject to management plans, but there is concern about the impact of harvesting on the species.
- The once well-established wood-processing industry, which had a strong body of professional knowledge and significant areas of certified forests, is confronted by a number of difficulties, including invasions of concessions by squatters, and high operating costs.
- In many areas, illegal logging and illegal crops are major constraints to the full adoption of SFM and the effective conservation of protected areas.
- In coming years, the recently approved National Plan for the Integrated Management of Forests is expected to introduce a series of modifications to forest management systems deployed in FMUs. It will broaden the focus of FMPs to improve control over resources, including timber and NTFPs, increase community-based production forestry, and encompass the management and conservation of forest services.

Brazil
- Brazil has a tropical-forest PFE of 310 million hectares, the largest in the tropics.
- A wide range of policies, strategies, laws and regulations have been developed to facilitate forest administration, improve timber legality and achieve SFM. Law enforcement has been strengthened, but the vastness of the resource and the spread of colonization make it difficult to control forest illegality.
- The main instruments used by the Brazilian Forest Service for the sustainable production and management of federal public forests are forest concessions and allocation to local communities.
- Communities have management rights in 160 million hectares of publicly owned forest (including indigenous lands outside the Amazon region).
- A national policy to support community forest management has been implemented with the aim of encouraging and organizing the country's forest management activities, and it also establishes minimum prices for NTFPs.
- There has been a significant increase in the area of certified natural forest in the Amazon. At least 2.70 million hectares of natural tropical forest for production (all certified) are considered to be under SFM.
- Control and law enforcement in the Amazon are extremely difficult because of the vastness of the area, poor infrastructure, a lack of capacity and the large number of actors contributing to deforestation and illegal logging. Other problems facing forestry in Brazil are the remoteness of many forests from centres of commerce and control; the weak economic competitiveness of SFM as a land use; the lack of competitiveness of the tropical timber industry; extensive degraded forests; the lack of full-cost pricing and abundant availability of low-cost timber; and a serious shortage of management skills.

Peru

- Peru has the second-largest forest area in the Amazon Basin, with an estimated PFE of 38.9 million hectares comprising 18.7 million hectares of natural production forest, 19.4 million hectares of protection forest and 820 000 hectares of planted forest.
- After a broad consultation process, a new forest law was approved in 2011 that creates new institutions and foresees the provision of stronger support to community forest management initiatives. The preparation of secondary legislation is under way.
- The rate of deforestation has declined and the country has put in place specific programmes with ambitious plans to reduce deforestation to zero by 2020.
- The average area per concession is quite small (12 900 hectares), so the financial viability of concessions will depend in large measure on the capacity to obtain good prices for products. In addition to forest concessions, two other concession types allow some timber harvesting: Brazil nut concessions (covering an area of about 900 000 hectares), and reforestation concessions.
- An estimated 1.60 million hectares of the production PFE is under SFM. In 2010, a total area of 713 380 hectares was certified, including 15 forest concessions and 16 community forest areas.
- Despite the difficult macro-economic situation for the timber trade, Peru has increased its exports of hardwood timber and further developed its domestic timber industry. Nevertheless, most exports are in the form of sawnwood, and there has been only limited development of further-processing in the country.
- There is considerable potential for REDD+ in Peru. However, many local and indigenous people see REDD+ as a threat, and considerable efforts are needed to clarify it and related forest issues with local stakeholders.

Perceptions of MFM

From consultations with more than 100 individuals in the three target countries, it appears that the concept of MFM is understood in a range of ways. Differences arise on the following aspects:

- **Theoretical concept**. MFM is characterized in various ways, such as: integrated management; a sustainable production system; and a strategy to add value or use certain techniques. Conceptual elements such as environmental or ecosystem principles, ecological integrity, economic and financial feasibility, and the social environment are also considered part of MFM.
- **Spatial scale**. For some people, the MFM concept should be applied only at the scale of the FMU, while others think it goes beyond the FMU to the landscape (or "anthropogenic forest unit") scale.
- **Type of forest cover**. The scope of MFM can include a variety of woody areas or other environments, specifically: primary forest (on uplands or in

flooded zones); secondary forests; degraded forests; forest plantations; and even agroforestry systems.

- **Use over time**. According to some, MFM involves the simultaneous use of products or ecosystem services in the same area, but others suggest that various uses may be applied over time within the same FMU.
- **Management objectives**. The purpose of using various products and ecosystem services may be commercial or for subsistence. For those who conceive MFM at the landscape scale, management is not only about forest products and services but also aquatic resources (e.g. management for sustainable fishing ponds).

Complementing the above on the question "what characterizes MFM", respondents noted that MFM:

- is defined, controlled and regulated locally, so it does not correspond with the formal management concept (i.e. it implies an adaptive management approach);
- varies in the intensity of resource use over time and space;
- operates over a wide range of forest types;
- integrates various systems of land use and landscapes;
- considers varying degrees of market linkages.

Another aspect relates to the perception of the importance of MFM and the opportunities that MFM may generate for managers and other stakeholders. MFM is seen as a system that:

- more closely corresponds with the traditional systems practised by families and communities for using and managing their forests;
- generates economic alternatives and employment opportunities for a wider group of people, at different times of the year and over longer periods;
- reduces extraction costs where favourable market conditions exist to harvest various products;
- increases economic security by diversifying production;
- opens the possibility of developing several businesses in the same forest area, reducing fixed costs at the administrative and management levels;
- enables the use of restricted areas (e.g. legal reserves in Brazil, which should cover 80 percent of the total area of rural properties in the Amazon);
- contributes to reducing rates of land invasion.

There was a general perception among respondents that a main challenge is integrating and applying MFM in the various conditions and meeting the many expectations.

The potential opportunities arising from the adoption of MFM can be summarized as follows:

- **Emerging alternative markets for products coming from MFM**. Areas under MFM can offer a diversity of products that until recently did not have a market value. The development and marketing of new forest products (e.g. for food, art and medicinal use) and services (ecosystem, social and cultural), particularly in niche markets, creates opportunities for rural communities

to be recognized and financially rewarded for the sustainable management of their forests. Large companies and small-scale producer organizations alike may consider MFM a marketing strategy to link their companies with good forest management practices and the participation of indigenous communities.

- **Compensation for ecosystem services**. The remuneration for the services provided by forests, called payments for ecosystem services (PES), is a promising way to increase the value of managed forests. A number of successful experiences exist in Latin America involving agreements and alliances between rural producer organizations, government institutions, companies and NGOs.
- **Readjustment of existing forestry projects**. The diversification of forest use increases the potential for interactions between timber harvesting and other forest products and services, for both economic (e.g. cost reductions, and entry into new markets) and social (e.g. community involvement and employment) reasons. This is an opportunity for existing public and private initiatives to look beyond the traditional focus on timber.
- **Environmental legislation**. In most countries, NTFPs do not have a favourable legal framework for their extraction and marketing, but good examples exist of standards that promote NTFP use. With MFM there is an expectation that laws will be reformulated to encourage the use of NTFPs and their marketing in "green" markets.

Overview of identified MFM initiatives

About 30 initiatives, mostly in Brazil and Peru, were identified in the three target countries, mainly through the consultation process but complemented by a literature review and a Web-based search. Not all these initiatives corresponded with the concept of MFM used in this study, and some were at initial stages of implementation; the number reviewed here, therefore, was cut from 28 to 15 (Figure 2). See Annex 4 for a summary of the selected cases, and complete descriptions can be downloaded at www.fao.org/forestry/sfm/83861/en/.

Bolivia (Plurinational State of)

Relatively few MFM experiences were identified in this country due to the low number of respondents, although a literature search was also conducted. Respondents mentioned generic cases, mainly in the department of Pando (adjacent to the department of Madre de Dios in Peru and the state of Acre in Brazil), where the two main pillars of the extractive economy are *castaña* and timber. The two products are complementary in terms of the division of labour, since timber is harvested in the dry season and *castaña* in the wet season. There were two identified cases, both involving logging companies.

FIGURE 2
Location of selected MFM initiatives, Amazon Basin

Brazil

In the Brazilian Amazon, MFM experiences are found mainly in the context of areas created by the government for forest conservation and use and to serve as models for the environmental sustainability of productive activities. Such areas comprise extractive reserves (*reservas extrativistas*, RESEXs)[11] and reserves for sustainable development (*reservas de desenvolvimento sustentável*, RDSs), which are under the responsibility of the Chico Mendes Institute for Biodiversity Conservation and the National Institute of Colonization and Agrarian Reform (INCRA), respectively. The state of Acre stands out for its experiences of MFM in RESEXs, such as in the Porto Dias Extractive Reserve, which was created in 1996. Some settlement projects under the responsibility of INCRA are also generating MFM-relevant experiences, particularly agro-extractive settlement

11 An extractive reserve is an area used by people whose livelihoods are based on the extraction of natural products and, complementarily, on subsistence agriculture and small livestock. The primary goal of extractive reserves is to protect the livelihoods and cultures of the communities and to ensure the sustainable use of the natural resources in the reserves.

projects (*projetos de assentamento agro-extrativista*, PAEs); the Chico Mendes PAE is the best known of these and is also located in Acre.

In the RESEXs, RDSs and PAEs, traditional communities[12] – including extractive communities, river-dwellers and *quilombolas* (an ethno-racial group descended from African slaves) – set individual areas, including specific areas of production, and areas for communal use (Carvalheiro, Sabogal and Amaral, 2008). Communities practise an extractive system based on household production and characterized by the manual harvesting of forest products – predominantly latex from rubber trees (*Hevea brasiliensis*) and Brazil nuts from *Bertholletia excelsa* – and, more recently, commercial logging following FMPs. There have been community forestry projects in these units since the 1990s, although almost always they have relied on external (financial, technical and governmental and non-governmental) support. In the past, the main proponent was the Project to Support Sustainable Forest Management in Amazonia (Promanejo), which was implemented by the Brazilian Institute of Environment and Renewable Natural Resources with funding mainly from the World Bank and Germany's KfW through the Pilot Programme to Conserve the Brazilian Rainforest. In many cases, projects supported by Promanejo enabled forest management to be certified by the Forest Stewardship Council (FSC).

In the states of Pará and, to a lesser extent, Amazonas and Rondônia, experiences are still incipient. They include initiatives developed in the Tapajós National Forest and on the TransAmazonian Highway, which reconcile the diversified production of non-timber products (such as oils, organic leather, honey, and perennial crops in subsistence agriculture) and timber.

Some of the experiences are based on agreements between companies and communities, mostly focusing on logging as the only product. Experiences are being gained in the area of influence of the BR 163 (another highway in the Amazon), notably through the Maflops Project, where a cooperative and a company are collaborating to support initial forest management activities (Cruz *et al.*, 2011). Forest companies such as ORSA Florestal and CIKEL – the two largest companies in the Brazilian Amazon whose forest management for timber production has been certified – are also promoting pilot-scale initiatives.

Companies such as Natura, Agropalma, Sambazon, Bolt House and Fruta Fruta are enabling communities to commercialize forest products for medicinal use. Usually, however, a common denominator in agreements between companies and communities is suspicion about how the agreements are made. Given the considerable experience that has been gained, the lessons learned about the process of developing company–community partnerships should be taken into account and applied to improve the agreements and their implementation (e.g. CTA, 2006; ITTO, 2007; Amaral Neto *et al.*, 2011).

Because of legal restrictions, indigenous peoples in Brazil cannot harvest timber on their lands for commercial purposes, and their experiences with timber management are therefore only at an experimental scale. On the other hand,

12 Conceptualized in the Law of Public Forests (Law No. 11 284, of 2 March 2006, Clause 3, item X) as "traditional populations and other human groups, organized by successive generations, with lifestyle relevant to the conservation and the sustainable use of biodiversity".

indigenous communities have had some success in marketing various non-timber products, such as oils, processed natural fibres, and handicrafts made from seeds.

Although there are interesting experiences in the marketing of ecosystem services (e.g. in the REDD+ project in the Juma RDS in Amazonas), they do not include commercial timber harvesting. It is possible that PES schemes may impose restrictions on timber harvesting, and there may also be constraints related to a lack of clear guidance on how such schemes should operate.

Peru

MFM initiatives in Peru mainly comprise the management of community forests by indigenous peoples and small-scale producers in the departments of Loreto, Madre de Dios and Ucayali.

There are diverse development projects, mostly funded by international cooperation, that support community forest management in the Amazon and which usually promote multiple uses. Several of these are in Loreto, a vast region inhabited predominantly by *mestizos*, river-dwellers and indigenous peoples generically called *bosquesinos*.[13] The Focal Bosques project, for example, was implemented in 2003–2009 by the Peruvian Amazon Research Institute (*Instituto de Investigaciones de la Amazonia Peruana*), with funding from the European Union, with the aim of strengthening the capacity of local actors to generate and implement proposals for SFM in the Loreto region. Another example is the Nanay project, where timber and NTFPs are used by individuals and families.

A growing practice is agreements between private companies and native communities for timber harvesting, but there are also agreements that focus on production chains based on the harvesting of NTFPs, such as the case of the yarina palm (*Phytelephas macrocarpa*) for the production of buttons and handicrafts. As in Brazil, there are still many problems to overcome to ensure that such agreements are fair and that they encourage harmonious relationships in the use of forest resources (CEDIA, 2009).

Forests in Madre de Dios are rich in *castaña* and rubber trees, the traditional use of which is widespread. In many forest concessions, *castaña* and the timber of various species (primarily high-value species such as mahogany, *Swietenia macrophylla*; cedar, *Cedrela odorata*; and shiuahuaco, *Dipteryx odorata*) are harvested simultaneously. REDD+ projects are emerging in the region (e.g. the Maderija–Maderacre and Espinoza Group concessions), which may provide interesting lessons for MFM. Known as the ecotourism capital of Peru, Madre de Dios is also developing experience in combining ecotourism activities with the production of NTFPs, as is the case of the *El Infierno* indigenous community and several initiatives that include reforestation and agroforestry systems.

13 The term *bosquesinos* refers to people whose livelihoods come from extracting and transforming forest resources. The *bosquesino* lifestyle typically combines collection activities, hunting, fishing and horticulture (Gasché, 2002).

Main constraints on MFM

The difficulties of implementing MFM are numerous, covering economic, technical, environmental, social and institutional aspects. Respondents were fairly consistent in their opinions on some of these aspects, emphasizing various limiting factors according to their training and experience.

In essence, the limitations on MFM are similar to those affecting SFM focused on timber production. In MFM, however, the limitations increase in magnitude because there are more variables, depending on the number of products and services to be incorporated in management. Limiting factors were grouped as economic, technical, sociocultural or political–institutional, as follows:

Economic factors

- The low value obtained for forest functions and ecosystem services
- Unattractive and inaccessible markets
- The high costs of diversified management
- Lack of (knowledge of) profitability

Technical factors

- Lack of technical information on forest resources and their integrated management
- Few (adequately) trained personnel
- Lack of good examples and poor disclosure of what is known

Sociocultural factors

- Weak organizational skills and business management of producers
- Conflicts related to the multiple-use or integrated approach to development projects

Political–institutional factors

- Lack of policy support for MFM
- Lack of financial incentives for MFM
- Inadequate legal framework for MFM
- Insecurity of tenure and use rights
- Lack of adequate technical assistance.

Many respondents identified the **limited market for products derived from MFM** as the most practical limitation. The low level of production of many products, mainly NTFPs, hinders their commercialization at a sufficiently large scale, although there is a wide variety of species with different uses. To this is added the lack of market consolidation – NTFPs are of secondary importance and produce marginal revenues compared with timber harvested in the same area. The low supply of products results in a lack of interest in the market place. Along with this, there is little legal clarity on the marketing of many NTFPs, with the result that they are often sold illegally and at very low prices, mainly through middlemen.

Many products produced through MFM are sold with **minimal or no processing**, which substantially reduces profits and hinders the competitiveness of MFM with alternative land uses. On the other hand, producers have very little knowledge of or access to attractive and accessible markets for products produced in MFM areas, due largely to a lack of infrastructure for the storage, processing and transportation of such products. Although interest in and expectations of markets capable of remunerating farmers for ecosystem services are growing, there are still very few consolidated agreements between local communities and businesses and, to date, PES has had a minimal effect on improving the profitability of MFM in the surveyed initiatives.

There are significant **gaps in information** on applying a more integrated approach to forest management, especially when the objective is to work with non-timber forest species and combine their use with commercial logging. Few, if any, technical personnel are equipped to support the varied demands of MFM in terms of knowledge and practical experience, management techniques, the development of supply chains, business management and commercialization.

The **organizational weaknesses of rural producers** heavily restrict their ability to adopt new practices in resource use and to enter new markets. Low management capacity is one of the most critical constraints on MFM initiatives and on turning them into profitable businesses.

There is still **no specific and appropriate policy** to support rural development based on MFM. In many cases, current laws on forest products, especially NTFPs, are inadequate. Legal obstacles exist that prevent the marketing of products derived from community management, a fact that encourages the illegal sale of these products.

An institutional problem is the **fragmentation of government actions** because policies are designed and implemented in isolation, without coordination between sectors, restricting and even generating conflict at the level of the rural producer. In the Brazilian Amazon, for example, significant efforts are made to train young people to use community forest resources sustainably, but little attention is paid to the creation of small-scale community-based agribusinesses in which the knowledge acquired by these young people could be put into practice. On the other hand, while programmes exist that provide incentives for forest production at the community or family level, the requirements are cumbersome (for example, organizations have to be totally free of any legal dependence) and there are significant bureaucratic hurdles to overcome to access such incentives.

The role of **government institutions** is weak due to a **shortage of human and financial resources** and a lack of interinstitutional coordination. One of the biggest shortcomings is in the capacity of government institutions to provide technical assistance and extension to rural producers. There is a marked shortage of agricultural and forestry technicians with sufficient training to support producers and communities in developing forest-based production systems and MFM in particular.

Some of the gaps identified point to a **lack of technical knowledge** on the

preparation and execution of MFM plans. The traditional technical approach at the community level is based largely on academic concepts that do not work or are not adapted to local conditions and realities. Projects operating in forested areas are often unprepared to cover the full suite of potential uses; the models used by these projects are adaptations of silvicultural business models that have little to do with the realities of local producers.

Enabling factors for implementing MFM systems

Respondents noted a number of factors and opportunities that are encouraging the implementation of MFM.

- **New market niches**. This is perhaps the key new opportunity because of the growing demand for natural products and the potential of PES. These niches are related directly to the changing preferences of consumers, and also to the concern at various levels (from local to global) for environmental degradation and the recognition of the varied roles of forests, including their important contributions to local livelihoods.
- **International pressure to conserve forests**. International and national debates on tropical forests, particularly concerning deforestation in the Amazon driven by agricultural expansion for export cash-crops and energy, are leading to demands for stricter conservation measures and the more efficient use of remaining forests.
- **Technological advances**. Related to the above factors, technological advances are opening up new possibilities for the use of resources previously undiscovered or extracted extra-locally for various purposes (e.g. phytotherapy and nutrition) and for the production of high-value-added forest goods (e.g. more compact and efficient processing equipment).
- **Appeal to forest-dependent people**. Given the strong correlation between communities and MFM, another factor perceived as an opportunity is the increasing ethical and commercial interest in the traditional knowledge on resource use held by indigenous peoples and communities living in, or dependent on, forests. Indigenous and other local communities are seen as the best custodians of forests and are closely associated with the important values and benefits of forests.
- **New legislation with explicit emphasis on multiple use**. In Bolivia (Plurinational State of), for example, there are efforts to ensure the explicit inclusion of both timber and non-timber uses and guidelines in formal management plans.

Conditions for MFM implementation

In what context could MFM be possible? What are the necessary conditions for it to work? The answer to these questions is related to the limitations on and opportunities for MFM. The following framework conditions or factors are considered important, if not key, for MFM implementation:

- **Organization and management capacity** for harvesting, processing and marketing forest resources. It takes a strong business base (including good

business plans and strategic plans) to gradually incorporate new goods and services from forests in the production process. There is a need, therefore, to strengthen local technical capacities for organizing, managing and administering forest-based enterprises. Well-designed and implemented agreements or alliances between producer organizations and government institutions and NGOs can speed up the adoption process, mainly in relation to commercialization. Training courses on the various components of the production chain, such as harvesting methods, business management and the formation of cooperatives, are a high priority for communities committed to improving their forest-based activities and generating added value in a sustainable way.

- **Links with the market** based on a diversified offering of sustainably harvested forest products. Access to niche markets often requires some sort of product certification.
- **Access to technological and market information** to add value to products and take advantage of market opportunities. Access to biological, ecological and silvicultural information is also a key to ensuring the sustainable production of the various products.
- **Adequate technical basis for management planning, implementation and monitoring**. Adequate techniques and practices are needed on, for example, forest zoning within the management unit to differentiate areas for logging, NTFP harvesting, etc.; estimating the value of forest resources for multiple goods and services when carrying out inventories; guidelines to maintain forest diversity and reconcile the various forms of extraction; defining cutting size classes; and harvesting regimes.
- **Appropriate legal framework** for enabling MFM design and implementation. In the case of ecosystem services, there is a need for laws regulating PES options as well as indicators and standards for measuring ecosystem services.
- **Clear and secure rights to land tenure and resource use**.
- **Promotional policies**, especially to support communities. A step in this direction would be to set minimum prices for certain products derived from MFM. There is a need for specific incentives, such as PES or compensation for conservation measures, and for support in meeting legality or sustainability requirements. Moreover, government agencies need to better coordinate their actions.
- **Quality technical assistance** with long-term support. This requires an adjustment in the way technical assistance and rural extension services are designed and delivered, heavily influenced as they are currently by an academic vision of treating technical activities in a piecemeal fashion rather than holistically.
- **Easier access to capital and financing** for viable businesses based on SFM practices. This requires favourable credit lines for investments in processing and marketing.
- **Dissemination of experiences**, in varying contexts, that can serve as demonstrations of the practical application of MFM.

- **Awareness-raising and education** for rural families and communities, officials in agencies involved in the sector, and consumers in general. The exchange of experiences among producers is a strategy with considerable potential. Consumers could be made more aware of the virtues of purchasing products from sustainable sources.

SOUTHEAST ASIA

Southeast Asia's forests[14] covered 214 million hectares in 2010, which was 49 percent of the region's land area. National forest cover ranged from 26 percent in the Philippines to 68 percent in the Lao People's Democratic Republic. Several countries in the region also have significant areas of other wooded land.

The forests of Southeast Asia are among the world's most species' rich and most threatened. Four of the 25 global biodiversity hotspots – in which a significant proportion of the world's species are under threat – are found in the region. Forest clearance shows little sign of abating. Forest area declined by 0.5 percent per year in 2005–2010, compared with 0.3 percent per year in 2000–2005 and 1.0 percent per year in 1990–2000. The greatest rates of reduction in forest area were in Cambodia, Indonesia and Myanmar. On the other hand, forest area increased in the Philippines, Thailand and Viet Nam.

With the passing of Southeast Asia's era of "peak timber" and given increasing demands for food, fuel and fibre, a lack of financial and institutional support for SFM is jeopardizing the future of the region's natural forests and biodiversity. The legacy of high-impact logging has also undermined the future of SFM by reducing the value of forest resources, while reductions in the harvest of natural forests may increasingly turn attention towards plantation-grown wood and wood-product imports. Despite increasing demand for forest products, the conservation and protection of forests have become primary objectives of forest management in several countries. Implementing a switch towards forest protection has, however, often been associated with problems at the field level, including a proliferation of illegal logging.

Forest policy and institutions

Natural forests in Southeast Asia are predominantly state-owned or administered (Katsigiris *et al.*, 2004; FAO, 2006), although most of Papua New Guinea's forests are under clan ownership. In several countries in the region, forest and forestland allocation processes have changed in the last decade as economic frontiers have advanced and societal demands have shifted (Edmunds and Wollenberg, 2003; FAO, 2006). The area of forests on which secure tenure rights have been devolved to local stakeholders remains extremely small, however, and unclear forest tenure constrains SFM in many countries (FAO, 2006). Only in Viet Nam have rights over significant areas of forest been devolved to individuals and families, communities, the private sector and other economic entities.

The forest sector in Southeast Asia has undergone substantial changes in the past decades. Major shifts have occurred in response to broader developments

14 This section is adapted largely from FAO (2010c) and Yasmi *et al.* (2010).

such as economic, population and infrastructure growth, globalization and policy shifts. In some cases, forest-related policy has been a major driver of change, while, in others, forest policy has been implemented only weakly and other factors have driven change. Among the target countries in the survey, complete or partial logging bans in natural forests have been imposed in the last two decades in Cambodia, the Philippines and Viet Nam. With such changes in forestry objectives, many countries are moving away from state forest management (Edmunds and Wollenberg, 2004). At the same time, devolution, decentralization and multi-stakeholder forest management schemes have grown, although challenges in maintaining the transition remain.

In several Southeast Asian countries, the socio-economic contribution of forestry remains poorly realized and underestimated due to benefit capture by unaccountable interests. The lack of collection of royalties and taxes has also undercut markets for products from sustainably managed sources. In addition, corruption constitutes a significant threat to forestry and national economies, particularly where revenues from logging are substantial. Within countries, direct efforts to improve forest law enforcement and governance have varied in their effectiveness, and many challenges are yet to be overcome.

Overview of the forest situation in target countries[15]

Cambodia

- Cambodia has an estimated 8.31 million hectares of PFE, comprising 3.71 million hectares of natural production forest, 4.53 million hectares of protection forest and 69 000 hectares of industrial timber plantations.
- All forest is state-owned, and conflicts over land tenure are a significant problem.
- Failures in the (production) forest management system resulted in the suspension of concession licences in 2001. Following a moratorium between 2004 and 2007 there have been moves to reintroduce commercial logging in natural forests, but to date the area of forest in which harvesting is permitted is small. Currently no part of the production PFE is considered to be under sustainable management.
- Even though an estimated 85 percent of the country's people live in rural areas, only a small area of forest is under community forest management. The 2006 Guidelines on Community Forestry and its relevant policies (*prakas*) define operational steps to secure forest management agreements. The government is looking to increase the area under community management to 2 million hectares and a community forestry office has been established within the forest administration.
- The rates of both legal and illegal deforestation are significant. A "forestry stamp" has been created to assist with log-tracking and the prosecution of illegal logging.

15 This section is based largely on Blaser *et al.* (2011).

- Forest-sector reforms have been developed but are yet to be implemented effectively; the enforcement of existing policies, laws and regulations remains weak.
- The government has been an active participant in the development of REDD+, and two pilot projects are under way in the country.

Indonesia

- Indonesia has an estimated PFE of 68.4 million hectares, comprising 38.6 million hectares of natural production forest, 27.3 million hectares of protection forest and 2.5 million hectares of planted forest.
- Indonesia's forests have been degraded progressively since the 1960s through timber exploitation and pulp and paper production in the 1970s and 1980s, followed by oil-palm plantation establishment beginning in the 1990s. The 1999 forestry law introduced principles of good governance while promoting social objectives by recognizing forestland tenure and user rights and allowing the involvement of individuals and cooperatives in forest-based business (Wadojo and Masripatin, 2002).
- Threats facing the country's forests include illegal logging, fire, encroachment, poor logging practices, inefficient timber-processing, unsettled land claims and regulatory inconsistency and confusion.
- A process to decentralize forestry administration has been partially reversed, and greater coordination between the levels of government is needed to overcome problems in, for example, land-use allocation, forest conversion, illegal logging, illegal timber trade and industrial inefficiency. Efforts are under way at the national level to combat illegal logging, and it appears that some progress has been made.
- An estimated 3.16 million hectares of the production PFE are under SFM, and an area of 1.36 million hectares of protection PFE is also considered to be under SFM. The area of independently certified natural production forest is 1.125 million hectares, up from 275 000 hectares in 2005.
- The timber sector has been undergoing massive change; for example, the volume of tropical hardwood plywood produced in 2009 was one-third the volume produced in 1995.
- A programme to restore degraded forests and especially to establish new planted forests has been announced, with the aim of covering more than 21 million hectares.
- Climate-change concerns are integrated into Indonesia's forest-related institutions and a national strategy for REDD+ is being implemented in stages, including through the large-scale funding of REDD+ pilot projects.

Lao People's Democratic Republic[16]

- The forest area in the Lao People's Democratic Republic in 2010 was estimated at 15.75 million hectares, of which 9 percent was primary forest

16 No PFE has been defined.

and 89 percent was "other naturally regenerated" forest (FAO, 2010a).
- The granting of forest concessions was suspended in 2008, and mechanisms were prepared to encourage the greater involvement of local people in forest management to support the maintenance of forest resources and the reduction of poverty.
- The Forestry Strategy 2020 represents a step forward in guiding the forest sector towards multiple objectives and community involvement, with poverty reduction at the forefront, although people-centred forestry remains largely unimplemented (Hodgdon, 2008).

Malaysia

- Malaysia has an estimated PFE of 14.4 million hectares, comprising 10.3 million hectares of natural production forest, 3.58 million hectares of protection forest and 539 000 hectares of planted forest.
- The Forestry Department Headquarters, Peninsular Malaysia, is responsible for forest management in Peninsular Malaysia and the forestry departments of Sabah and Sarawak have responsibility in those respective states. Sabah's forest policy emphasizes production and trade, with less focus on biodiversity and no provision for community participation.[17] Sarawak's 1954 forest policy emphasizes production and revenue generation within the limits of sustainability, and does not include social or environmental aims (Sarawak Forestry Department, 2009).[18]
- The forest sector plays an important role in the Malaysian economy and is a significant employer.
- Malaysia's forests are generally well managed, and there is a well-defined and demarcated PFE. An estimated 5.95 million hectares of the production PFE is under SFM, with 5.23 million hectares of the natural production PFE being certified.
- The harvest in natural forests is declining and will continue to decline until at least 2020. The shortfall in production from natural forests is expected to be met by planted forests, especially in Sarawak.
- There remains a need to better address the concerns and land claims of indigenous communities, especially the Penan in Sarawak.

17 The effects of poorly defined tenure and low interest in long-term investment in the sustainable management of natural forests have been addressed through sustainable forest management licence agreements, launched in 1997, which provide 100-year tenure over large areas of logged-over forests. Reserves for communities and community forestry projects are set aside within these areas. So far, the results of the initiative have been mixed, and several licences have been revoked due to non-compliance. The high opportunity cost of the land suggests that, in addition to stable tenure, external funding will be required to protect the forests (Sabah Forestry Department, 2009).

18 In 2004, the Sarawak Forest Department devolved powers to the Sarawak Forestry Corporation, a private company owned by the government and responsible for the management of forest resources and timber administration. The Forest Department's role is limited to policy development and regulation (Chan, 2008).

Papua New Guinea

- Papua New Guinea does not have a formal PFE and almost the entire forest estate is under customary land ownership. About 10.5 million hectares of forest might be considered permanent, comprising 8.7 million hectares of forest over which timber rights have been acquired, 1.7 million hectares allocated for protection and about 58 000 hectares of planted forests.
- A national forest policy (in place since 1990) promotes forest conservation in particular, but it is not strongly supported by the Forestry Act and no forests have been set aside for conservation since then (Hurahura, 2008). The lack of a national land-use plan is one reason for poor management in areas designated for commercial forestry.
- The Papua New Guinea Forestry Authority has well-qualified staff but is seriously under-resourced and is unable to conduct significant field monitoring. Provincial forest management committees established to facilitate consultation with landowners also lack resources.
- As of 2010, the Papua New Guinea government had acquired timber rights from customary landowners involving about 12 million hectares of forest. These rights are normally allocated to foreign developers with the necessary financial capabilities. Of the acquired area, an estimated 4.9 million hectares of forest were under active timber extraction licences in 2007.
- An estimated 193 000 hectares of the production PFE are under SFM, 2 700 hectares of which are certified.
- Re-entry to "closed" logging areas and the "creaming" of premium species are undermining SFM.
- Papua New Guinea's forests are thought to be vulnerable to climate change, but the country also has potential for forest-based carbon capture and storage.

The Philippines

- The Philippines has an estimated PFE of 6.35 million hectares, comprising 4.70 million hectares of natural production forest, 1.34 million hectares of protection forest and 314 000 hectares of planted forest.
- The Philippines has lost a substantial part of its natural forest, and timber production has declined dramatically in the last three decades.
- An executive order issued in 1995 established community-based forest management (CbFM) as the national strategy to ensure the sustainable development of the nation's forests. In recent decades, property rights over public forest land have been granted to local communities and the private sector in an effort to address deforestation and forest degradation while increasing social justice and reducing poverty. However, land-tenure issues continue to constrain forestry development.
- More than 5 000 communities have CbFM agreements with the government over nearly 6 million hectares, and there is now also a mechanism for individuals to engage in forest stewardship under property rights agreements,

although to date few such agreements have been issued.
- At least 79 000 hectares of the production PFE are under SFM, but there are no certified forests.
- Resources within the Department of Environment and Natural Resources have been reconfigured to focus on the restoration of ecosystem services and the creation of economic opportunities in upland areas.
- The government is strongly engaged in international REDD+ processes. The Philippines has considerable potential for carbon capture and storage through forest restoration and afforestation, if forest governance can be improved.

Viet Nam[19]
- Viet Nam had an estimated forest area of 13.8 million hectares in 2010, predominantly naturally regenerated (74 percent) and planted (25 percent) (FAO, 2010a).
- Since the national introduction of free market principles in 1986, and particularly in the last decade, substantial changes have taken place in the forest sector, including the re-organization of state forest enterprises, changes in forest ownership, and growth in wood product exports and forest protection (the latter funded partly by PES).
- Laws have been enacted in the past two decades to allocate land to households and individuals for sustainable forest production, the conservation of flora and fauna, and forest protection.
- Forest degradation is a serious, widespread problem. The commercial value of natural forests has declined considerably, and most timber-rich forests are in remote and inaccessible areas.
- The allocation of benefits to local groups has often been insufficient. Regulatory constraints favouring forest protection over use, and inequitable benefit-sharing arrangements, have variously been implicated (Nguyen, 2006; Nguyen *et al.*, 2008).

Overview of identified MFM initiatives

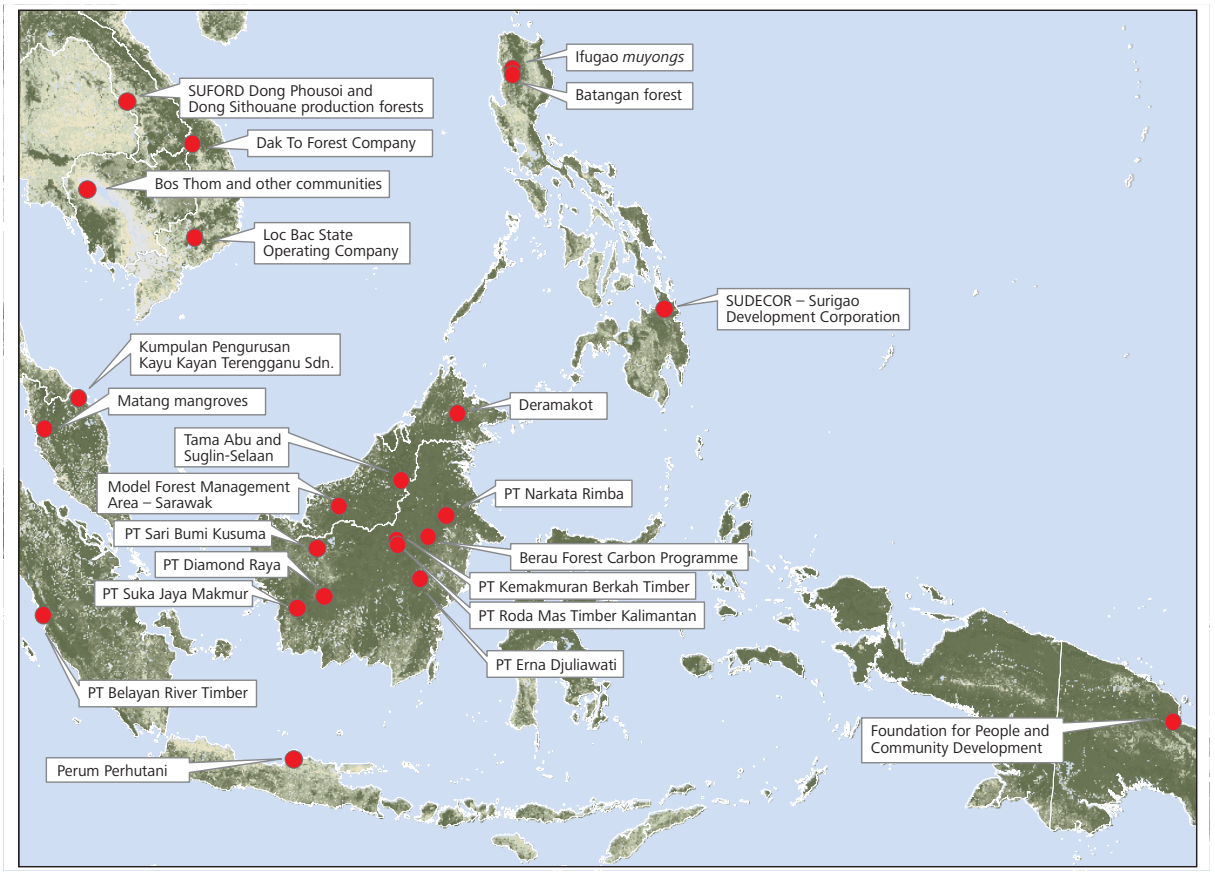
MFM is taking place in isolated areas in the region with a high degree of success. The downside is that only a small proportion of the total forest estate appears to be well managed, and in some countries there are very few examples of MFM.

Overall, 23 examples of MFM were identified, comprising 18 at an industrial scale and six at a small or medium scale (Figure 3). Twenty examples involve contiguous areas of forest that are tens of thousands of hectares in size, and the remaining four involve relatively small forest areas. See Annex 4 for a summary of the selected cases, and complete descriptions can be downloaded at www.fao.org/forestry/sfm/83861/en/.

In 20 cases the forest is state-owned and in four cases – in Papua New Guinea and the Philippines – the forest is owned by clans or communities. In 14 of the state-owned areas, forest management is carried out under concession agreements

19 No PFE has been defined.

FIGURE 3
Location of selected MFM initiatives, Southeast Asia



with private companies, while in two cases – in Cambodia and the Lao People's Democratic Republic – forests are managed by communities in partnership with the state. In the remaining four cases where there is state ownership, management is carried out either directly by the state or by state-owned enterprises.

All examples include an implicit and, in almost all cases, an explicit focus on social and environmental forest management objectives in addition to timber extraction and, as such, the outputs are multiple. Common reference is made to the collection of NTFPs by local communities, and soil, water and biodiversity conservation are also mentioned frequently as management objectives. Carbon sequestration is mentioned in two cases.

Few of the initiatives include efforts to add value to forest products through processing and marketing. It was evident during the information-gathering phase that many more examples of MFM exist in the surveyed countries, particularly Indonesia and Malaysia and possibly also Viet Nam. In the Philippines, there may have been more examples in the past but these are now winding down or have ceased due to the latest in a long line of logging bans in the country. The logging ban in Cambodia has also prevented the wider implementation of MFM that includes timber production. In the Lao People's Democratic Republic, it

appears that there is very little in the way of SFM outside the areas supported by the Sustainable Forestry and Rural Development (SUFORD) project, although the model developed by the project is due to be implemented throughout the country's production forests.

Cambodia

The only example of MFM found in Cambodia involves the harvesting of poles by communities in previously heavily logged areas in Siem Reap Province. The poles are generally sold, with no further processing, for fish-trap manufacture and construction. NTFPs are also collected in designated forest areas. Several communities are involved, and although the initiative began in 1998, pole harvesting began only in 2003. Renewable 15-year community forestry agreements were signed between the communities and the Forestry Administration in 2007. The initiative has been supported by FAO, the Government of Belgium, the Government of New Zealand, the Spanish Agency for International Development Cooperation, the Danish International Development Agency and Cambodia's Forestry Administration.

Forest management has been hampered in the past by permit requirements for harvesting and by excessive tax demands by the Forestry Administration that have, however, subsequently been waived. Pole harvesting has now ceased while FMPs are being prepared. Once these are cleared, communities will no longer require permits to commence harvesting.

A criticism of the pole-harvesting initiative is that the total revenue generated by the sale of poles by participating communities was dwarfed by donor expenditure to support the project. Additionally, the value of poles is low when spread across entire communities, and pole harvesting is only possible during a relatively short phase of the forest regeneration process.

The small number of MFM examples in Cambodia is due largely to the 2001 logging moratorium, which curtailed logging nationwide. Forest concession licences were either revoked or suspended, resulting in a reduction in legal logging. However, the moratorium apparently led to an increase in illegal logging and a shift in focus from commercial to small-scale operators; from few players to many; and from export to domestic markets.

Land-tenure issues and weak rights in forest areas reduce the potential for long-term investment in forest management. Although there are more than 420 community forestry sites covering around 400 000 hectares, only 94 sites, covering 113 544 hectares, are recognized legally and the approval process is very lengthy (Forestry Administration, 2009).

With recent moves towards decentralization, the role of local councils and governments is being considered more seriously in supporting community-based natural resource management and SFM and in monitoring forest management (Rotha, 2009). The government, as well as donors, appears to be putting greater emphasis on transferring natural resource management rights and responsibilities directly to communities rather than local councils.

Indonesia

Ten examples of MFM were identified in Indonesia. Nine of these are FSC-certified timber concessions[20] – seven in the lowland dipterocarp forests of Kalimantan, one (PT Diamond Raya) in swamp forest in Riau Province in Sumatra and one managed by *Perum Perhutani* in Java and Madura. In accordance with FSC certification criteria, the forests are managed sustainably for multiple outputs including timber, NTFPs, ecosystem services and social benefits.

The uncertified example of MFM comprises forests included in the Berau Forest Carbon Programme in Berau District, East Kalimantan, where eight of the district's 13 timber concessions, including Sumalindo Lestari Jaya, are working with The Nature Conservancy to improve forest management. *Perum Perhutani* manages 2.4 million hectares of plantation and natural forest in Java and Madura for the production of timber and NTFPs and for watershed protection and ecotourism. Four of its FMUs – around 60 percent of its teak production area, which constitutes around half the total area managed – are certified by the FSC.

To expand SFM in Indonesia, the government has promulgated the Forest Management Concept (FMC; Ministry of Forestry, 2011), which aims to provide a field-focused structure for the sustainable management of protection, production and conservation forests. An FMC may have more than one function and plays the role of forest management organizer in the field, ensuring that forest management is undertaken sustainably. The main problems and challenges encountered to date with the development of FMCs are a lack of financing; limited understanding about the function of the FMC and its benefits for forest development; and the limited understanding of the concept among forestry personnel and therefore in their capacity to implement it.

Other problems include the poor definition of the roles of various government levels and an associated lack of coordination; a lack of forest management technical knowhow; legislative confusion; the need for greater administrative competency; differing views of FMUs in relation to economic benefits and the marketability of ecosystem services; and a lack of infrastructure.

Lao People's Democratic Republic

The single example of MFM identified in the Lao People's Democratic Republic is provided by areas covered by the SUFORD project, in particular Dong Sithouane and Dong Phousoi in Savannekhet and Khammouane provinces and the six sub-forest management areas within those forests, totalling 82 760 hectares, that are certified by the FSC. These areas had previously received support through the Forest Management and Conservation Programme before being taken over by the SUFORD project, which in its first phase (2004–2008) worked in eight production forests in four provinces.

The extension phase of the SUFORD project has expanded to cover five more provinces and four more production forest areas. In total, the project is operating

20 Sumalindo Lestari Jaya in Berau District, East Kalimantan, also holds an FSC forest management certificate, but information is not included on the FSC website. See www.responsibleasia.org/?p=244

in 16 of 51 production forests and 36 districts in nine of the 17 provinces. The efforts support work in more than 1.2 million hectares, or on approximately one-third of the total national production forest area.

The project applies a participatory approach to SFM in which village forestry organizations work in partnership with the Forestry Department to undertake forest management activities. Benefits from timber sales are shared between villages and various levels of government. The area covered by the initiative includes lowland semi-evergreen, mixed deciduous and dry dipterocarp forests, much of which has previously been logged and is poorly stocked.

Malaysia

The five examples of MFM identified in Malaysia comprise two in Peninsula Malaysia (the Matang mangroves in Perak and Kumpulan Pengurusan Kayu Kayan Terengganu Sdn. Bhd. – KPKKT – in Terengganu); two in Sabah (Deramakot and KTS Plantation Sdn. Bhd. in the Segaliud Lokan Forest Reserve); and one in Sarawak (the Model Forest Management Area). It could be argued that all production forest in Malaysia could be considered examples of MFM, especially those areas certified by the Malaysian Timber Certification Scheme (which has been endorsed by the Programme for the Endorsement of Forest Certification).[21]

The Matang mangroves cover 40 151 hectares and have been managed by the Forest Department of Peninsula Malaysia as a production forest reserve since 1902. Although originally a natural forest, the area has gradually been converted to a planted forest as successive blocks have been clearfelled and replanted. Harvesting takes place on a 30-year rotation, and replanting is carried out two years after felling. Outputs include fuelwood and poles, and the main income-earner is charcoal, which is mostly exported to Japan. Local communities and private entities use the area for fishing (e.g. mud crabs, cockles and sea bass cage culture); ecotourism has mostly been conducted in the area on an ad hoc basis, but walkways have been constructed and are used for educational and ecotourism purposes. The government provides funding to cover all operational costs except extraction, which is undertaken by private companies under licence. The royalties are minimal compared with the management costs, and the state does not receive income from charcoal manufacture and sale.

The KPKKT timber concession in the south of Terengganu state has been in operation since 1983 and comprises 108 900 hectares of lowland dipterocarp, hill dipterocarp and lower montane forest. Management follows the principles of SFM and is based on the Malaysian Selective Management System; harvesting is on a cycle of 25–30 years. Local communities have access to NTFPs and employment opportunities and reduced impact logging (RIL) techniques are employed, although there is a need for improvement.

Deramakot in Sandakan District in Sabah covers 55 139 hectares of lowland mixed dipterocarp forest. The area has been administered and managed by the

21 In response to a request for information for this work, the Sabah Forest Department sent letters to 18 forest concessions and, although only one (KTS Plantation) forwarded information to FAO, it is likely that management in many would qualify as MFM.

Sabah Forest Department as a forest reserve since 1961. High standards of forest management have been achieved and the area is certified by the FSC. The forest is harvested on a 40-year cycle using RIL techniques. Because the forest had previously been logged heavily, the annual allowable cut is strictly adhered to, and enrichment planting is used to help boost future production. To improve prices, logs are sold at auction, but Deramakot has not achieved financial sustainability; on the other hand, the environmental costs associated with uncontrolled logging have been greatly reduced. The production of NTFPs and fuelwood, and ecotourism, are included as management objectives.

The Sarawak Model Forest Management Area is located between Bintulu and Sibu and was supported by a series of ITTO projects between 1996 and 2007. The area comprises 162 500 hectares of hill forest managed by the Sarawak Forest Department as part of the PFE. The FMP for the area was developed by the Sarawak Forestry Department and the ITTO project and included consultation with 6 000 local people inhabiting 49 longhouses. Efforts were made to support local communities through, for example, road development, the piping of water and the provision of timber for longhouses. RIL techniques and helicopter logging are used, but the implementation of SFM reduced the annual harvest by 15–20 percent due to the expansion of protected forests and a reduction in the harvest to sustainable levels. RIL and enrichment planting are, however, aimed at increasing the future harvest.

Papua New Guinea

The only example of MFM identified in Papua New Guinea is a group initiative in which a number of actors are engaged, through a coordination mechanism, to support forest management. The Foundation for People and Community Development (FPCD) is an NGO based in Madang Province, and its work encompasses six clans scattered across the province's six districts. The FPCD was awarded an FSC group certificate in June 2007, and the six clans are managing their areas of lowland tropical rainforest, totalling 10 810 hectares, under the group certificate through the FPCD's Certified Community Forestry (CCF) programme. Other clans, such as the Tingari near Brahman, are also being assisted by the CCF programme to join the group certificate. The forests are used for the extraction of timber as well as NTFPs for food, medicines, construction and "customs work" (ceremonies, etc.), and the forests provide ecosystem services such as water and soil conservation.

The Philippines

Three examples of MFM were identified in the Philippines: the Ifugao *muyongs* in Ifugao Province; the Surigao Development Corporation (SUDECOR) in northern Mindanao; and the Batangan forest in Mountain Province. Timber from the Ifugao *muyongs* and Batangan forest is not sold commercially, although manufactured products from the latter are produced and sold.

The Ifugao *muyongs* are areas of mixed deciduous and pine forest managed

by local communities according to traditional methods. Individual areas cover only 0.5–3 hectares but the total area is 12 542 hectares. Households have had permanent tenure over the *muyongs* since enactment of the Indigenous People's Rights Act, 1997. The forests have been used for the production of timber and NTFPs for many years and also play an important role in watershed management. There are no FMPs, and forest practices are governed by customary rules and regulations.

The SUDECOR initiative covers 75 745 hectares and has been producing timber since 1959. Forest management in the area has been supported by various projects over the years funded by the Government of Germany and ITTO. SFM is practised with the involvement of local communities and the general objective of the current medium-term FMP is to sustainably manage the natural forests for the production of high-quality dipterocarp timber without jeopardizing the rights of indigenous cultural communities or impairing the non-timber benefits obtained from the forests. Activities under the initiative were suspended in 2011, however, when the government imposed a national logging ban through Executive Order 23, which bans logging "in all natural and residual forests" due to the alleged causal association with landslides. The expectation is that the SUDECOR initiative will close (R. Umali, personal communication, 2013). The Society of Filipino Foresters published an open letter in reaction to the logging ban proposal and the damage to forestry that it would cause.[22]

The Batangan forest covers 43 618 hectares and is owned by indigenous communities. *Pinus kesiya* comprises up to 60 percent of forest cover and is harvested by individuals according to local ordinances and customary law for local consumption and the manufacture of furniture and souvenirs. According to FAO (2005b):

"*The indigenous communities within the Cordillera Mountain Range, in the northern part of Luzon, have a rich cultural heritage. Through experience and learning, the different tribal groups have developed management strategies to sustain their resources in a rugged mountainous environment. Common property ownership and management by families, clans and villages militates against land conversion, while community-initiated management practices have led to the establishment of pine plantations and the natural regeneration of pine and mossy vegetation. Strong indigenous socio-political institutions at the village level facilitate decision making and conflict resolution*".

Viet Nam

Two examples of MFM were identified in Viet Nam: the Loc Bac state operating company (SOC) in Lam Dong Province; and the Dak To Forestry Company in Dak To and Tu Mo Rong districts. However, the operations of most SOCs could be considered to be MFM if passively managed ecosystem services and minor forest products are considered as multiple outputs in addition to timber.[23]

22 SFFI on logging ban. *The Philippine Star* (4.02.2011). Available at: http://www.philstar.com/letters-editor/653890/sffi-logging-ban (www.philstar.com/Article.aspx?articleId=654218&publicationSubCategoryId=135).

23 As of 2010, the total forest area under management by SOCs is 3 213 936 hectares, and the total area of forest in Viet Nam is 13 390 000 hectares (sources cited in Gibbon *et al.*, 2011).

Of the 34 851 hectares managed by the Loc Bac SOC, only 4 704 hectares are subject to harvesting (using RIL techniques), while the rest is protected for soil and water conservation. The 35-year plan identifies the following five management objectives: natural timber exploitation (harvesting); *Acacia* and *Melia* forest exploitation (conversion of bamboo and mixed forest and young, poor-quality forest to *Acacia*, *Melia* and rubber plantations); bamboo exploitation; the processing of forest products; and the tending of planted forests. There is pressure to convert the area to a protected forest, although there is some doubt over the effectiveness of contracting local people to protect and manage the forest.

The Dak To Forestry Company, another SOC, manages 14 040 hectares in Dac To, of which 6 663 hectares is production forest (of which only 2 725 hectares is well stocked). The management objectives for the area are divided into economic, social and environmental themes according to the principles of SFM. Rattan and bamboo are the main NTFPs collected in the area and the forest is also used by local communities for subsistence. Management of the area was supported by funds provided under Programme 661 (the Five Million Hectare Reforestation Programme). There was some concern that sufficient funding would not be available to continue operations when Programme 661 terminated.

Main constraints on MFM

Commonly identified constraints to MFM in the target countries were:

- low forest growth and productivity, often related to past uncontrolled logging;
- low timber prices and a low premium for certified timber;
- a lack of accessible financing;
- the costs associated with social and environmental management;
- NGO and local resistance to logging operations, and social conflict;
- illegal logging and encroachment;
- the entrenched mindsets of existing forestry stakeholders;
- government interference, including logging bans and burdensome approval processes;
- human resource limitations;
- poor infrastructure;
- pressures to fully protect forests.

The main constraints faced by MFM initiatives are set out below, by country.

Cambodia

- The low productivity and degraded condition of the logged-over forests to which the communities have access, and the need to spend time and money on forest protection.
- Over-extraction associated with illegal logging.
- Obtaining finance for the preparation of FMPs.
- The fact that pole harvesting can be applied during only a relatively short phase of forest regeneration.

- The low value of poles compared with the size of the involved community.
- High taxation levels and burdensome bureaucratic requirements for requesting waivers.
- Government interference, including multiple lengthy approval processes – community members are unable to take action without approval from the central level, and under the Community Forestry Subdecree (2003) it is necessary to obtain permission from the Ministry of Agriculture, Forestry and Fisheries for all commercial harvesting on any community forestry site.

Indonesia

- The low price premium for certified timber, mainly because high-paying markets accept illegal timber.
- Illegal logging, which threatens MFM in many areas.[24] The clearing of forest for oil-palm and timber plantations and mining are also increasing issues as global and local demand for land increases.

In PT Sari Bumi Kusuma, the viability of MFM is threatened by claims for compensation from local people excluded after the granting of the concession and by the overestimation of forest growth rates and underestimation of costs associated with environmental, social and health and safety issues. In other FSC-certified concessions, constraints on the implementation of SFM and MFM are relatively minor, including social claims and consultation requirements; health and safety; and environmental issues such as road construction and erosion control, the implementation of harvesting guidelines, the management of high-conservation-value forest, and the monitoring and control of illegal logging.

Lao People's Democratic Republic

- The legacy of unsustainable logging in less commercially productive forests.
- The small amount of timber available for harvesting, which reduces the surplus available for benefit-sharing to a level that is insufficient to act as an incentive for villagers to engage in forest management.
- The threat of revision of benefit-sharing arrangements (villages with more and better-quality forest and better market access receive greater benefits).
- The difficulty in replicating village forestry without external financial and technical assistance.
- The lack of sufficient human resources to carry out forest inventory and forest management planning in a timely manner.
- Delays in the distribution of shares from previous years' logging.
- The lack of a viable financing mechanism to cover operational costs and provide villagers with incentives.
- The lack of adequate legislative and policy support and the tendency for provinces to interpret and implement national policies in differing ways.
- Poor forest governance.

24 E.g. the Berau Forest Carbon Programme, where more than 75 percent of all emissions associated with land-use change is estimated to have come from forest degradation rather than deforestation.

Malaysia

The five examples of MFM identified in Malaysia were affected by a range of constraints, in particular those resulting from past and sometimes current logging excesses. In Deramakot, past unsustainable logging has resulted in a shortage of commercial species and the proliferation of bamboo and lianas. Past practices also left their mark on the mentality of foresters: adjusting their approach to management was a major challenge in the early stages and required substantial training and cuts in bureaucratic processes. Additionally, illegal logging has been a problem, and Deramakot is working with local communities to help eradicate it.

The Model Forest Management Area in Sarawak also suffered from excessive extraction in the past. The control of forest management operations and the supervision of logging were poor, and there was a lack of enrichment planting. Logging and skid trails caused large losses in stock, and regeneration was lacking in some areas and needed to be remedied. Also, there was a lack of capacity to implement SFM (due to inappropriate work skills) and poor local participation.

In the case of KPKKT, the application of the Malaysian Selective Management System resulted in excessive offtake and logging damage. At the same time, logging contractors have been unwilling to accept the additional initial costs of RIL.

The situation in the Matang mangroves differs significantly from the above because this forest has been managed sustainably with government support for more than 100 years. The area is not financially self-sufficient, but the government continues to subsidize its management because it is considered traditional.

Papua New Guinea

- A lack of infrastructure and financing.
- The scarcity of start-up capital to finance operations.
- A lack of capacity and technical know-how.
- The remoteness of many forest areas and associated inaccessibility, making it difficult to link communities to the markets and services necessary to support MFM.
- The comparatively low income derived from MFM and the related temptation to "make a quick buck" from intensive logging undertaken by outside companies.
- In the FPCD initiative, the comparatively low income generated by MFM, the distance to markets, and the lack of local (clan) capacity.

Philippines

The three examples of MFM identified in the Philippines represent three quite different forest management scenarios and the range of constraints they face differs accordingly.

The main constraint faced by the SUDECOR initiative is the 2011 logging ban, but there are also social issues. Through various policy pronouncements, and Executive Order No. 263 in particular, the Philippine government has upheld the primacy of community-based against corporate-based approaches to resource

management. Existing timber licence agreements, under which corporate-based approaches (including SUDECOR's) operate, face expiration in the next 15 years, and operators in the corporate mode will have to articulate a socially acceptable agenda. As it is now, all holders of timber licence agreements are required to undergo an environmental impact assessment process, which requires substantive community-based consultations. Another issue for SUDECOR is the demand of some tribe members for the return of their ancestral land occupied by the company.

In the Ifugao *muyongs*, key constraints include the prohibition on commercial production, and economic pressures to convert the *muyongs* to agricultural and residential areas. The need to apply to government for a formal title to own and manage traditionally owned *muyongs* is another constraint. Applications to cut trees are also considered burdensome.

In the Batangan forest, the only reported constraint is an expansion in the number of owners due to population growth.

Viet Nam

There is doubt about the effectiveness of contracting local people to protect and manage the forest. Other constraints include: a lack of staff (on average there is only one staff member per 1 000 hectares); and the threat of infrastructure development (the increased access afforded by new roads or hydropower plants leads to deforestation and forest degradation).

In the area managed by the Dak To Forestry Company, the efficacy of forest protection and management, forest fire management and technical extension services is limited due to insufficient personnel. The company has forest protection contracts with local people and implements planting and road maintenance in partnership with local residents, but the company receives only limited support from local people. The forest is overmature and contains large amounts of dead wood: as a consequence, forest fire and associated management constitute a major expense and risk, and illegal logging and encroachment also pose problems, while the hilly and mountainous terrain limits the area available for timber harvesting. In initiating improved forest management in the area, difficulties were encountered in changing the ideas of staff to apply new technologies and standards rather than conventional methods of timber extraction, and to consider environmentally and socially sound techniques. Obtaining the funds for road construction and equipment, for example, is also a challenge, and there is concern over how the company will finance its operation after the termination of the Five Million Hectare Reforestation Programme.

Enabling factors for implementing MFM systems

With the exception of Cambodia and the Philippines, where logging bans or moratoria are in place, framework conditions do not appear to directly restrict MFM, and timber-harvesting operations that provide additional outputs are able to function according to their own principles without excessive hindrance. The

main constraint on MFM, which was highlighted in relation to certification efforts in Indonesia, is competition from operators whose sole objective is to extract timber with little or no concern for multiple uses such as NTFP production, social welfare or the provision of ecosystem services.

In this sense, continuing efforts are needed to stamp out the illegal and unsustainable production of forest products and to provide incentives for the provision of social and ecosystem services. Currently, international efforts are supporting these goals, particularly through moves to prevent trade in illegal forest products (e.g. the Lacey Act in the United States of America and the European Union's timber regulation) and through REDD+. At present, however, the extent to which these measures will support MFM is unclear, given that many tropical timber producers and manufacturers are concerned that illegal timber regulations will form trade barriers that will close down the tropical timber trade.

Similarly, the complexities of implementing REDD+ activities that include timber harvesting could mean that activities become focused on forest protection. There already seems to be a tendency towards community forestry, which may result in considerable expenses without yielding the most efficient means for timber production. For example, the cost associated with establishing a community forestry project in Cambodia has been estimated at US$54 900, and implementing community forestry across the current national forest estate in that country would cost close to US$200 million (Broadhead and Izquierdo, 2010). As such, there is a critical need to find low-cost methods of implementing MFM that can be mainstreamed, rather than consigning the concept to donor-supported pilots.

Another problem is the threat of encroachment and forest conversion arising from population growth and increased investment in land development. This is particularly pertinent in higher-rainfall areas, where population densities remain relatively low and land is available for conversion to agriculture (Broadhead *et al.*, 2012). The lack of demarcation of PFEs and national land-use plans in most countries further limit interest in investment in long-term forest management (FAO, 2010b). In Cambodia and the Philippines, in addition to the logging bans and moratoria, requirements for permits and clearances limit MFM; this does not seem to be so critical in other countries.

CONGO BASIN

Central Africa contains the world's second-largest area of contiguous humid tropical forest, covering about 200 million hectares (Mayaux *et al.*, 1998).[25] The forests of the Congo Basin are home to a huge variety of flora and fauna, and approximately 3 000 species are endemic. For local residents, this biodiversity constitutes a pool of resources, services and raw materials; the Congo Basin forests are also a globally significant store of carbon.

The overall level of deforestation in the region is relatively low. The gross annual rate of deforestation in the period 1990–2000 was 0.13 percent, although

25 Most text in this section has been taken from Ernst *et al.* (2012).

this rate doubled in the period 2000–2005. At the country level, this increase in gross deforestation was significant in the Democratic Republic of the Congo, Cameroon and the Republic of the Congo and less so in Gabon and the Central African Republic. The primary direct threats to forest cover are fuelwood collection; agriculture (shifting cultivation); mining and oil extraction; the production of agrofuels; and logging (industrial as well as informal).

The formal forest sector plays an important role in the economy of Central Africa in terms of its contribution to GDP and also because of the advantages presented by two of its key characteristics: it is based on a renewable raw material and, as such, guarantees revenue for as long as the resource is adequately managed; and it is largely integrated into a rural economy that has limited other means of generating income. The forest sector is often the main sector providing direct and indirect employment and is important in generating income for local people and funding for infrastructure in rural areas.

The coming years will be critical for forests in the Congo Basin. Population growth, immigration and economic development in the region, plus increasing demand at the global level, will inevitably increase pressure on natural resources. This could lead to considerable degradation and increased poverty for the very large number of people who are still heavily dependent on readily available forest resources.

Forest policies and institutions

While forest regimes in Central African countries[26] date from the colonial period, all countries in the region adopted new forest codes in the period 1990–2000 that outlined the requirements for forest management. Despite being the legal owners of their forests, Central African states are ill-equipped to manage them on a day-to-day basis, especially given the forests' vast size, their inaccessibility and the fact that administrations lack adequate human and financial resources. Forest laws have therefore tended to allocate long-term forest concessions or other forest logging titles to private companies.

The gradual establishment of sustainable production-forest management has been one of the major developments in the forest sector in the Congo Basin in the last 15 years; little by little, SFM approaches have replaced extractive approaches involving intensive logging and inadequate planning. While the SFM process is well under way in Cameroon, the Central African Republic, the Republic of the Congo and, to a lesser extent, Gabon, it has only just begun in the Democratic Republic of the Congo, which is the biggest forest country in the region. There has been a significant increase in certified area in Central Africa in recent years: in the first quarter of 2010, forest concessions with FSC certificates amounted to about 4.5 million hectares.

There are signs of increasing political will in the countries of the region to sustainably manage their forest resources, but this will has not yet been accompanied by an appropriate integration of forestry, rural development, governance and economic and social development policies.

26 Most text in this section has been taken from Bayol *et al.* (2012).

Overview of the forest situation in target countries[27]

Cameroon

- Cameroon possesses significant forest resources and has confirmed in the past five years its considerable potential for SFM. The PFE is estimated at 12.8 million hectares, comprising 7.60 million hectares of natural production forest, 5.20 million hectares of protection forest and 19 000 hectares of industrial timber plantations.
- The policy environment is good. However, the capacity of the Ministry of Forests and Fauna (responsible for forests) and the Ministry for Environment and Protection of Nature (responsible for climate change adaptation and mitigation and REDD+) to fully enforce the forest law and implement forest and environmental policies is low.
- The country is progressing well towards SFM. In 2011 (Mertens *et al.*, 2013), FMPs were being implemented in 5.3 million hectares of the production PFE (compared with 1.76 million hectares in 2005). In addition to FMPs, 3 million hectares had received private certificates of legality and around 1 million hectares were FSC-certified.

Democratic Republic of the Congo

- The Democratic Republic of the Congo has more than 112 million hectares of closed tropical forests and a relatively low level of conversion of forest to other uses. The PFE is estimated at 48.3 million hectares, comprising 22.5 million hectares of natural production forest and 25.8 million hectares of protection forest.
- Although notable progress has been made in recent years, civil conflicts make it difficult to realize the country's forest potential. The institutional reform process is in its early stages and the legal framework – including the decentralization process – needs to be further developed and harmonized.
- SFM has not yet been achieved on the ground, although some progress has been made in the establishment of FMPs for the natural-forest production PFE. Of the 9.1 million hectares of allocated forest concessions in 2010, about 6.59 million hectares were subject to detailed forest management planning.
- The volume of timber harvested is only a tiny fraction of the potential sustainable yield, even accounting for likely significant levels of illegal logging.
- The country has become engaged in the development of a national REDD+ mechanism.

Gabon

- Gabon has a large forest resource with a relatively low risk of conversion to other uses. The PFE extends over an estimated 13.5 million hectares, comprising 10.6 million hectares of natural production forest, 2.90 million hectares of protection forest and 25 000 hectares of planted forest.

27 This section is based largely on Blaser *et al.* (2011).

- Undeniable progress has been made towards SFM. The government continues to improve its legal and institutional framework to regulate and monitor production forests and to effectively manage protected areas.
- Forestry will remain one of the pillars of Gabon's economic and social development. Based on clear policy measures by the government, the private sector is a major driver of industrial forest development and the export of semi-finished forest products.
- An estimated 2.42 million hectares of the natural production PFE is under SFM, including 1.87 million hectares of certified forest (the largest in Africa). FMPs are fully developed in 3.45 million hectares of forest in concessions and in 2010 were under preparation for another 6 million hectares of forest in concessions.
- High standards for concession management have been developed on paper, but still need to be fully introduced on the ground.
- Community forests may be created in the *domain rural*, but their development has been insignificant. Management for bushmeat and other NTFPs is still largely uncontrolled, even though these issues must be addressed in FMPs.

Perceptions of MFM

On the basis of responses to questions on the uses valued in MFM, existing experiences and the harvesting modalities compatible with MFM, three concepts of MFM emerge: an industrial timber operation open to other uses and other stakeholders; forest use for multiple purposes; and organized management of all forest uses and functions.

In **Cameroon**, perceptions vary between three groups of actors: forest concessionaires, who focus on industrial timber exploitation but are open to other actors and uses; community foresters, who emphasize the desirability that (multiple) use reflects the ways in which communities have always used the forest; and civil society and researchers, who take a more management-oriented view in which multiple-use objectives are regulated on legal grounds or use clearly established techniques to plan, cater to stakeholder interests and ensure the sustainability of practices. These differences in perception can be explained by the distinct vision the three groups of actors have of the forest, as well as by their interests in it. For local and indigenous communities, the forest has always been seen as the main source of food, health products, materials for housing construction and trade, and connection with the spiritual world. Forests are therefore the subject of multiple uses, for which communities need neither permits nor a management plan. The objective of forest management for logging companies is the realization of profits from industrial timber production, while NGOs and research centres have another vision of the forest that is similar in some ways to that of community foresters. However, given the threats to forests, this third group believes that forest use must be organized and regulated, which explains its emphasis on management.

Perceptions identified in the **Democratic Republic of the Congo** were similar to those in Cameroon. Although differentiation of perceptions was not possible

by actor group, the association of indigenous people contacted had an identical perception of MFM to that of community foresters in Cameroon.

In **Gabon**, perceptions of MFM varied between two groups of actors: loggers and managers of the forest administration on the one hand, and NGOs and research institutes on the other.

Overview of MFM identified initiatives

MFM has become a priority objective of SFM, and its adoption is seen as a tool to balance the shortcomings of economic and social forestry models (García-Fernández, Ruiz-Perez and Wunder, 2008; Guariguata *et al.*, 2010). The MFM concept has been introduced into laws and regulations governing forest management in Cameroon, the Democratic Republic of the Congo and Gabon through the concepts of multi-actor management and multi-resource management, which promote the recognition of the use rights of local and indigenous communities and the participation of all stakeholders in forest management.

Every logging concession in Cameroon, the Democratic Republic of the Congo and Gabon is required by law to consider and implement MFM, especially for wildlife, NTFPs and cultural sites. These uses are to be mentioned in the FMP and their interactions with industrial logging activities must be explained. The design of a simple management plan for community forests follows the same rationale. In 2010, 180 logging concessions were managed according to FMPs in the three countries, and around 139 community forests were operating legally in Cameroon. Due to time and funding constraints, only 15 MFM initiatives were selected in these three countries on the basis of the availability of information and with a view to covering the range of SFM options, from FSC-certified concessions to concessions without a validated FMP. Two community forestry experiences were added, one in Cameroon and one in the Democratic Republic of the Congo (Figure 4).

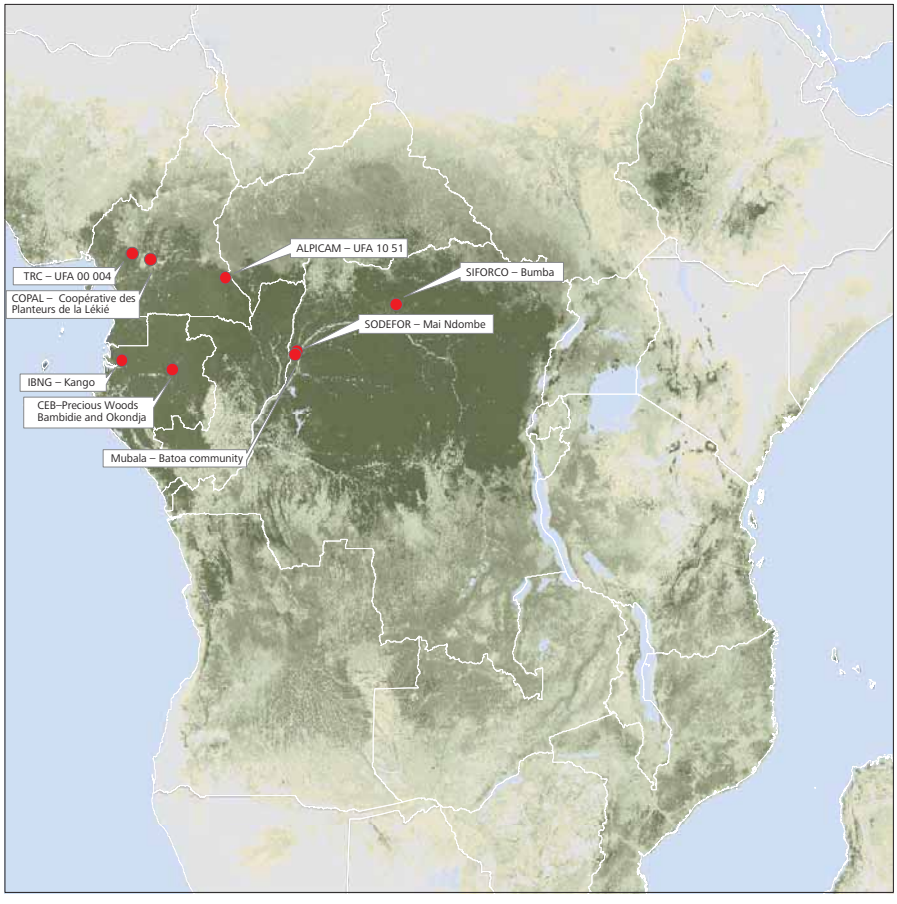
Eight case studies were identified for in-depth analysis and individual interviews with forest managers. For these case studies, the survey focused on the constraints and factors promoting MFM and the potential role of REDD+ in MFM. The selection criteria took into account:

- the type of forest in which MFM is implemented;
- the type of organization in charge of the initiative;
- the type of actors involved in the initiative;
- the scale and type of forest certification pursued by the initiative;
- the willingness of forest managers to collaborate.

See Annex 4 for a summary of the selected cases, and complete descriptions can be downloaded at www.fao.org/forestry/sfm/83861/en/.

Analysis of the initiatives revealed that the understanding and implementation of MFM depend mainly on three variables: the types of uses integrated; the costs of MFM; and the modality of MFM according to the harvesting title, the recipients of the MFM and the types of uses.

FIGURE 4
Location of selected MFM initiatives, Congo Basin



Uses generally integrated into MFM

Timber production, biodiversity conservation, the protection of sensitive areas and the extraction of NTFPs are the main uses implemented by the identified MFM initiatives. Carbon sequestration is a new concept and its implementation is still limited, especially since no forest code in the target countries even mentions it, although a pilot project is under way in a community forest identified as an MFM initiative in Cameroon. In Cameroon, agriculture is not permitted in forest concessions, which are part of the PFE and therefore permanently allocated to forest or wildlife habitat, but the FMPs of some forest concessions earmark land for agroforestry. The situation is similar in the Democratic Republic of the Congo; however, forest concessions there include agriculture because of the presence of riverine communities. In Gabon, the inclusion of agriculture in forest concessions is justified by the fact that the law gives this right to local people. Unlike the harvesting of NTFPs, hunting is not included in the majority of MFM initiatives.

Costs of MFM

CEB–Precious Woods reported investing over 1 billion CFA francs (€15 million) to develop its concession of 581 490 hectares, while Transformation Reef Cameroon (TRC) spent more than 100 million CFA francs (€1.5 million) for an area of 94 917 hectares. Without accurately quantifying the costs of MFM, these operators claimed that management costs with no direct bearing on the timber resource (e.g. the delineation of high-conservation-value forest, the management of NTFPs and the delimitation of community hunting zones) are additional costs for logging companies (and therefore proxy costs of MFM), which they would not be interested in supporting if they were not engaged in forest certification.

In community forests, forest use is limited mostly to the exploitation of timber and to domestic consumption (e.g. food, housing construction and medicinal products) (Essoungou, 2009). This was the case in four of the five community forests visited in Cameroon. The implementation of uses such as ecotourism and NTFP extraction requires substantial financial resources (e.g. for the construction of reception facilities for tourists, and preparing applications for certificates of operation or harvesting permits) that usually cannot be found within the communities themselves. Because of the lack of funding, local communities generally use an operating partner to finance forestry operations in advance and include the financing costs in the purchase price of timber at the expense of local communities. Under these conditions, at the end of the logging operation local communities are rarely able to raise enough money to oversee future operations (Essoungou, 2009).

Benefits and beneficiaries of MFM

The state, logging companies and local people are the main beneficiaries of MFM. The benefits for the state come in two forms: taxes and levies; and environmental benefits (e.g. biodiversity conservation, the protection of sensitive areas, and landscape restoration following felling). Logging companies also receive two forms of benefit: income from industrial wood production; and the prestige acquired through the implementation of measures for environmental protection.

Unlike timber companies, timber harvesting constitutes only a small portion of revenues received by local communities, especially when compared with the revenue generated by their agricultural activities and even the sale of NTFPs (e.g. the case of the community forests of COPAL). Unlike agriculture and the extraction of NTFPs, the products of which are mostly sold through informal channels, timber production requires significant financial and marketing resources that are usually out of reach of local people. There are also secondary beneficiaries of MFM: the global community benefits, for example, from the provision of globally important ecosystem services, and economic operators in the forest-product marketing chain are also beneficiaries.

Main constraints on MFM

Three main constraints on MFM were identified: inadequate legislation; the lack of rights to forest resources; and the lack of profitability in implementing MFM.

Inadequate legislation

In the countries of the Congo Basin, legal frameworks for forests recognize the use of forests for various purposes (e.g. production, protection, conservation and recreation) and the participation of stakeholders in forest management to meet their needs. However, the modalities of implementing MFM appear to be left to formal (official) or informal forest managers. Such is the case for use rights, the practical modalities of which are not specified clearly in regulations. Therefore, in the management of forest concessions, forest managers often seem to define use rights at will, which can cause a lack of coordination between the traditional uses of local people and the FMP. In the field, there are quite often "arrangements" between logging companies and local people to tolerate certain practices such as agriculture and the collection of NTFPs for commercial purposes. Thus, the regulation of MFM in forest concessions is often set on the basis of arrangements between logging companies and local people.

Lack of rights to forest resources for indigenous and local communities

In Africa, 98 percent of the land belongs to the state, which weakens the rights of communities over land and forest resources (Rights and Resources Initiative, 2009).

The lack of rights for local people to forest resources remains a major concern for SFM and has been identified as one of the causes of environmental degradation in developing countries because it does not encourage long-term investment in forest management (Kaimowitz *et al.*, 2005; Cubbage, Harou and Sills, 2007). Processes of democratic decentralization, in which many African countries are engaged, have made possible a greater understanding and recognition of traditional rights and practices in managing local resources (Larson *et al.*, 2010). However, the rights of local people to forest resources are contradictory to customary rights because they limit the traditional practices of local people (e.g. by restricting the collection of certain resources in the area; the requirement for authorization for home consumption; and the requirement of special permits for marketing). On the ground, arrangements sometimes exist to overcome these restrictions, but generally such arrangements are only made by certified logging companies.

Nevertheless, there are moves at the state level to implement the recognition of customary use rights. In Cameroon in the context of community forestry, for example, local communities benefit from a transfer of power that allows them to exploit forest resources on their land. This does not fully solve the problem, however, because the implementation of community forestry remains a luxury for many communities given the complexity and high cost of bureaucratic procedures. The sustainable exercise of customary and other rights to commercial use would be encouraged by simple rules of use applicable in time (e.g. by identifying a non-hunting season), space (e.g. to protect a high-conservation-value site), the

techniques employed (e.g. no gun hunting) and the status of users (e.g. must have been a village resident for the last two years).

Lack of economic profitability of implementing MFM

According to forest laws in the Congo Basin countries, logging companies only have access to the timber resources of a concession, while communities are permitted to exploit community forests for timber, NTFPs, ecotourism and agriculture. The harvesting and use of these resources is conditioned by the implementation of an FMP or a "simple management plan", depending on the forest title. However, communities struggle to find the funds to meet management requirements. In Cameroon and Gabon, the management of forest concessions requires 2000–3000 CFA francs per hectare (€3–5) (Buttoud *et al.*, 2005). This cost corresponds mainly to the development of the timber resources; in the context of MFM, however, operators are supposed to manage not only for timber but for all uses and functions of the forest (Cassagne, Bayol and Rougier, 2004). The costs involved to do this reduce the profits of operators and therefore their motivation to implement MFM. Such operators may seek incentives from the state for the implementation of MFM, such as tax relief, but this is unlikely in most countries in the Congo Basin. In community-managed forests, communities have the right to exploit timber and NTFPs and implement tourism activities; however, very few community forests are profitable, even through the combined exploitation of timber and NTFPs (Akoa Akoa, 2007; Rossi, 2008).

Enabling factors for implementing MFM systems

The development of MFM systems in the Congo Basin can be promoted through the effective application of customary use rights in forest concessions and by forest certification.

The effective application of customary use rights in forest concessions

In all three countries studied, local and indigenous people know their customary use rights to forest resources. Logging companies usually include these rights in the FMPs of forest concessions, most often with the aim of clarifying or limiting their scope and practice. To be effective, however, a meaningful dialogue on customary use rights is necessary between the logging company and local people, as required by law. As shown by Lescuyer (2007), Order No. 0222/A of the Ministry of Environment and Forests of Cameroon, for example, sets out the role of local people in management procedures for production forests. The order gives the management plan a tripartite structure featuring the relevant authority, the concessionaire and the people concerned. This structure is specified particularly for the purpose of supervising the various phases of forest management, including the internal zoning of uses, social infrastructure, mechanisms for dispute resolution and the participation of local people in management activities. This regulation is rarely enforced, however. Discussions with villagers suggest that forest zoning and socio-economic surveys may be listed in FMPs but not implemented.

Thus, the regulatory requirements have limited usefulness for improving forest management. For most logging companies, admitting the full exercise of use rights runs the risk that their concessions will become overrun by poachers, illegal sawyers and shifting cultivators.

An apparently simple measure to promote greater collaboration between local people and logging companies would be to apply the spirit of the law, which promotes participatory forest management. Unfortunately, however, the forest administrations that are supposed to implement the social advances contained in forest laws are also reluctant to believe in the virtues of involving local actors in the management of a space and a resource that, they think, rightfully belong to the state. Convincing the forest administration and logging companies of the benefits of social forestry, and increasing the awareness of local people about their rights and duties in forestry, could greatly extend the range of uses and products actually integrated into forest management.

Forest certification

By insisting on the conservation of biodiversity and respect for the use rights of local and indigenous people, forest certification can be a main driver of MFM. Indeed, principles 2, 5, 6, 7 and 9 of the FSC clearly take into account the management of various forest functions and the different actors involved in the use of these functions. In addition, forest certification pushes for the implementation of on-the-ground MFM initiatives, as shown by the Support Office for the Environment Villagers created by CEB–Precious Woods and the protocol for the protection of NTFPs developed by TRC. Similarly, in the context of certification, Société de Développement Forestier (SODEFOR) has signed a contract for the extraction of NTFPs (*mubala*, *Pentaclethra macrophylla*) with the indigenous community of Batoa Inongo, which can be combined with timber harvesting. These initiatives show that in the implementation of MFM there is a significant difference between FMPs and forest certification. In developing FMPs, managers usually define measures for MFM but, in practice, those measures are implemented only for timber resources. However, if they want to obtain forest certification, managers must implement all measures for MFM.

This difference can be explained by the fact that the management of forest concessions is not subject to a system that checks the implementation of the approved FMP, unlike forest certification that incorporates regular oversight. The mismatch between FMPs and the implementation of management is an indicator of the unwillingness of managers to invest in activities that favour the state and local people.

It should be noted that although FSC certification takes into account the conservation and protection of biodiversity and the rights of local and indigenous people, it does not cover aspects of MFM such as aesthetic benefits or carbon sequestration. In addition, the FSC principles and criteria are not explicit when it comes to implementing MFM measures. Principle 5 on forest benefits, for example, requires that forest management operations encourage the efficient use

of the multiple goods and services of the forest to ensure the economic viability and a wide variety of environmental and social benefits. However, these goods and services are not defined, leaving some freedom for the operator and the certifying office to do so.

Role of NTFPs

The marketing of NTFPs could be a valuable activity in the Congo Basin, despite a still-inadequate legal framework (FAO, 2009). Most MFM initiatives give special place to the extraction of NTFPs: some logging companies, such as TRC and SODEFOR, implement formal procedures that allow local people to collect these products. Outside certified firms, tolerance for these arrangements is widespread, but not organized by forest managers. Two factors probably prevent greater consideration of these products in MFM initiatives in Central Africa: on the one hand, forest managers are rarely the beneficiaries of such use; and, on the other, in most cases the marketing of NTFPs does not represent a substantial source of income for rural households because of the remoteness of the collecting areas and the irregularity of production, among other reasons (Lescuyer, 2010). From a strictly financial point of view, it makes more sense to better integrate agroforestry or agricultural practices in forest management because those activities can have a greater impact on the living standards of rural people.

4 Global survey

Requests to complete the global survey were sent to 1 990 recipients. Overall, there were 108 responses, of which 79 were complete and relevant. Of those 79 responses, 41 were from or concerned Latin America, 20 were from Southeast Asia and 18 were from Africa. Seventy-six percent of respondents had more than ten years of experience in the forest sector, 15 had 6–10 years of experience and only 9 percent had less than six years of experience. The majority (about 68 percent) of respondents were involved in the initiatives on which they reported as employees of NGOs, governments or international organizations (Table 3).

TABLE 3
Current workplace of respondents, as percent of total responses

Workplace	%
NGO	31.5
Government	19.2
International organization	17.8
Research institution	16.4
Private sector	12.3
Other	2.70

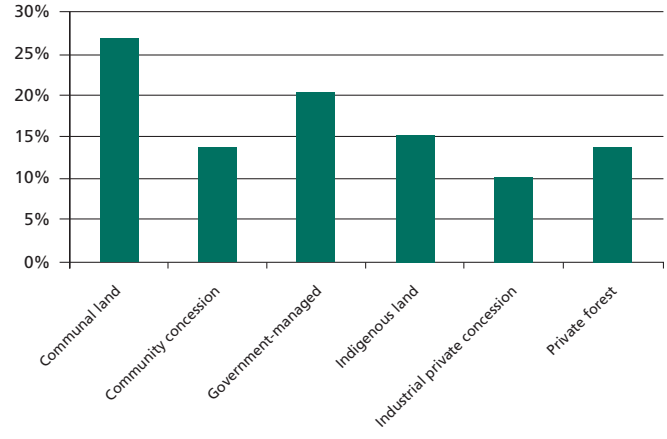
Note: n = 79

About one-third (30.4 percent) of the initiatives were experimental. The rest were operational at a small scale (defined as equal to or less than 500 hectares; 28.4 percent) or a large scale (41.2 percent). The majority (86 percent) of the initiatives were still under implementation at the time of the survey. Of those, about 10 percent were more than 10 years old, 56 percent were 1–5 years old and 23 percent were 6–10 years old. The remaining 11 percent were less than 1 year old. Around half the initiatives took place either on communal land or in government-managed forests (Figure 5). It was common for the initiatives to have either a government/formal (53 percent) or non-government/informal (31 percent) management plan.

Timber production and biodiversity conservation were primary management objectives of approximately half the initiatives in regard to economic output (Figure 6), whereas the production of NTFPs, and soil and water conservation, were the most important secondary objectives (Figure 7).

FIGURE 5

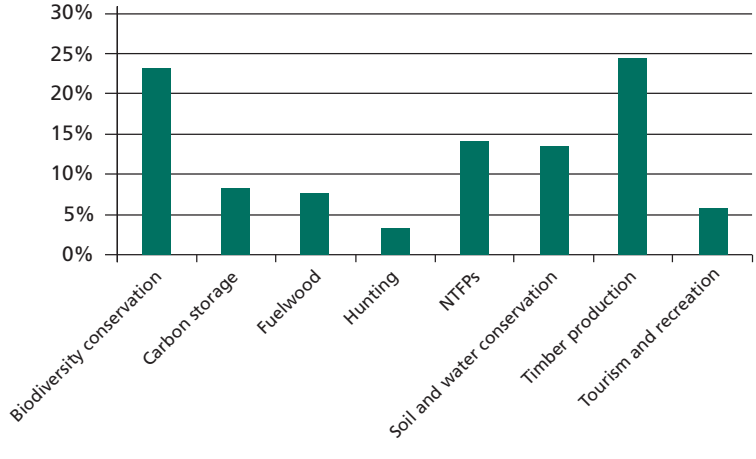
Land tenure types, by percent of surveyed MFM initiatives



Note: n = 79.

FIGURE 6

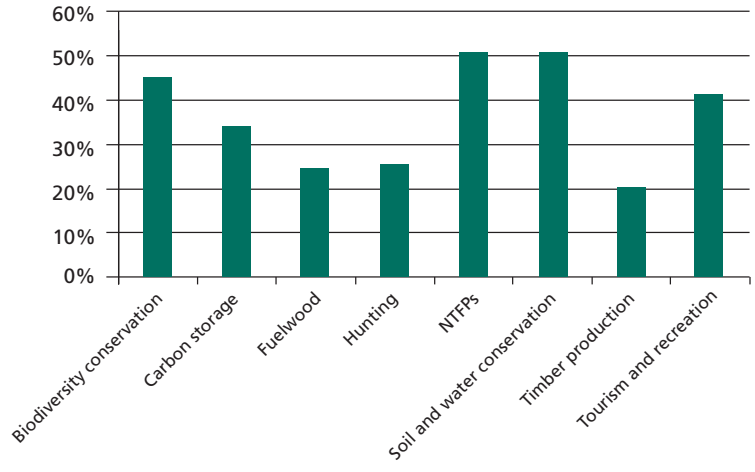
Primary management objectives, based on economic output, by percent of surveyed MFM initiatives



Note: n = 79.

FIGURE 7

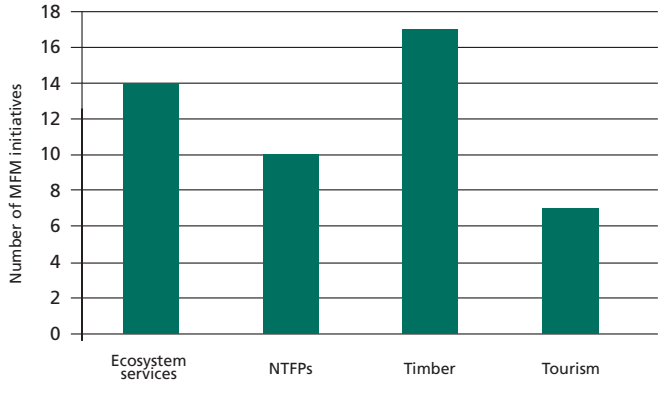
Secondary management objectives, by percent of surveyed MFM initiatives



Notes: several activities could be listed for one initiative; n = 79.

FIGURE 8

Number of MFM initiatives in which various products and services were either certified or in the process of becoming certified



Nearly one-quarter – 22.5 percent – of projects were certified, and another 22.5 percent were in the process of becoming certified. Timber was the most common product or service for which initiatives were either certified or were in the process of becoming certified (Figure 8). Of the surveyed initiatives, more than half were community-based, and timber and biodiversity conservation were the most frequent primary management objectives.

The survey results broadly concurred with those of the regional assessments. Political–institutional and social variables were perceived to be the most important factors hindering MFM, but a lack of adequate skills was also often mentioned

(Table 4). Current workplace categories were used to test whether respondents' perceptions of the strength of the barriers to MFM differed according to allegiance, but no significant differences emerged. Hence, respondents seem to be in agreement on the relative importance of barriers to the implementation of MFM.

Based on respondents' answers, 66 recommendations on how to increase the chances of success of MFM initiatives were identified. The single-most cited recommendation was "capacity-building", followed by "supporting policies and legislation", "involvement of communities" and "awareness-raising". The recommendations were further organized into 15 categories (Table 5). Although "community issues" is listed as its own category and includes factors such as "recognize and use traditional knowledge" and "resolve land tenure", community welfare is inherent in many of the other categories. "Improving implementation" was another major theme.

TABLE 4
Variables hindering MFM implementation, ranked on the basis of the total sums of ratings and average scores

Variable	Category[a]	Mean[b]	Sum[b]
Efficiency of administrative processes	P	3.16	250
Institutional or management structures and frameworks	P	2.95	233
Negotiation capacity	S	2.89	228
Forestry education	P	2.89	228
Security of tenure	S	2.86	226
Availability of trained personnel	K	2.84	224
Legal framework	P	2.78	220
Resources, knowledge and skills to accomplish the diversification of forest management	K	2.73	216
Access to credit or financial resources	E	2.70	213
Stakeholder involvement	S	2.70	213
Social conflicts about the impact of one management option on other products or services	S	2.66	210
Market-related knowledge	M	2.62	207
Access to extension service or support	K	2.57	203
Distribution of benefits among stakeholders	S	2.51	198
Technology-related knowledge	SK	2.47	195
Access to markets	M	2.39	189
Community–enterprise interaction	S	2.37	187
Ecological and silvicultural knowledge	SK	2.35	186
Knowledge about forest resources and services	SK	2.09	165
Gender participation or involvement	S	2.06	163
Influence of product prices or PES on decision to engage in MFM	E	2.04	161
Opportunity costs	E	1.86	147

Notes: [a] "Category" refers to the variables formed in the factor analysis, where E = economic; K = knowledge and skills; M = markets; P = political–institutional; S = social; SK = silvicultural knowledge;
[b] respondents were asked to score the importance of barriers on a scale of 1–4; n = 79.

TABLE 5
Categories of recommendations on how to increase the success of MFM initiatives

Category	Number of citations
Implementation	38
Financing	26
Stakeholder participation	25
Capacity-building	22
Market-related issues	20
Policies and legislation	18
Community issues	17
Incentives	11
Communication	10
Institutional issues	9
Education	7
Research	4
Data availability	3
Continuity of projects	2
Benefit-sharing	2

Note: n = 79.

Local agreements for forest use established by the Matses indigenous community

Fruit of marfil *vegetal or tagua (*Phyteleppas macrocarpa*) in the Peruvian Amazon*

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Vendors of the non-timber forest product leche de majo (Oenocarpus bataua) *in the market of Cobija, Bolivia (Plurinational State of)*

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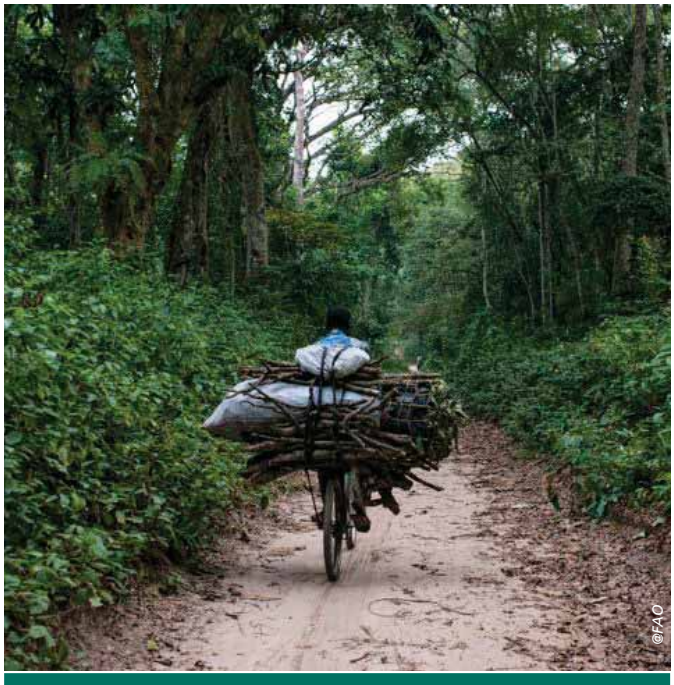
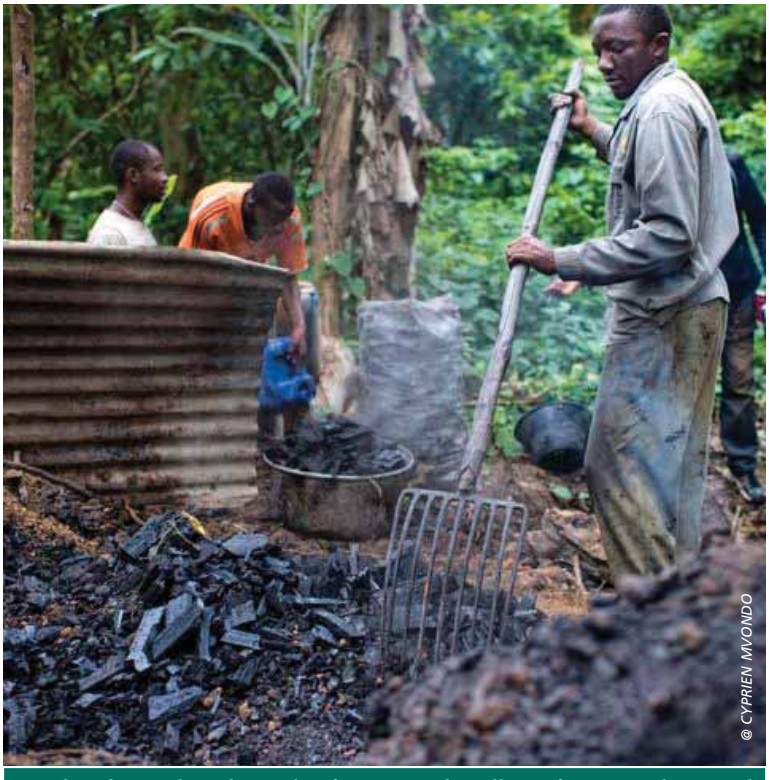
Brazil nut tree (Bertholletia excelsa)*, an important component of forest management systems in the region shared by Bolivia (Plurinational State of), Brazil and Peru*



On the way from the reserve, village of Masako, to Kinsagani, the Democratic Republic of the Congo

Bags of Gnetum *spp. and other products being transported to the markets of Bangui, Central African Republic*



Coal-maker cooling charcoal in forest near the village of Ovangoul, Central Region, Cameroon

*A team of chainsaw millers sitting on a ayous (*Triplochiton scleroxylon*) in Cameroon*

Local community in West Kalimantan, Indonesia

Village scenery in Halimun Salak National Park, West Java, Indonesia

Interview with a villager in the SUFORD project area, Lao People's Democratic Republic

Log pond, Papua New Guinea

5 Synthesis

The regional assessments canvassed 46 relevant MFM initiatives – 15 in the Amazon Basin, eight in the Congo Basin and 23 in Southeast Asia – in 13 tropical countries. Nineteen of these are the initiatives of private companies with concession contracts on public forestlands, mainly in Southeast Asia (e.g. 9 of 10 cases in Indonesia) and the Congo Basin. Local (indigenous) communities or associations of smallholders represent around one-third of all canvassed initiatives, mainly in the Amazonian countries, and six MFM initiatives are under direct government responsibility, of which five are in Southeast Asia (notably Malaysia). This report provides an overview of these initiatives, the constraints they face, and the opportunities they have for diversifying and integrating products and services within the same FMU. The evidence, opinions and perceptions gathered through interviews and surveys indicate that the practical application of MFM is a complex and challenging task in the prevailing conditions. In this sense, it can be stated, as suggested by García-Fernández, Ruiz-Perez and Wunder (2008), that "MFM remains a valid management alternative under specifically favourable local context conditions, especially when practiced at the landscape scale".

There is wide variation in the forest area encompassed by the surveyed MFM initiatives, from 1 900 hectares to almost 1 million hectares in the Amazon Basin, from almost 11 000 hectares to more than 2.1 million hectares in Southeast Asia, and from 4 800 hectares to almost 200 000 hectares in the Congo Basin. It should be mentioned, however, that in many cases it is unclear what constitutes the actual area managed for multiple uses. The smaller areas are mostly forests managed by indigenous peoples (e.g. in Papua New Guinea and Peru) or by associations of small-scale extractors (e.g. rubber-tappers in extractive reserves in Brazil). Initiatives described as pilot or experimental were found only in the Amazon Basin, but this may only reflect differences in information sources. There are also differences in the timeframes of initiatives. Those in Southeast Asia are mostly more than 10 years old, while in the other regions the largest proportion has been under way for 6–8 years. The more recent initiatives are mostly those where an ecosystem service is part of management outputs.

In many of the countries analysed in this report and for certain categories of actor, MFM remains an interesting yet barely operational concept due to economic, technical and administrative constraints. Timber is still the only forest commodity with major lucrative markets, whose operation is based on a reliable body of technical knowledge, and which provides a significant contribution to national economies. The dominant model of timber harvesting is, however, being undermined in some regions by the arrival of investors interested in agro-industrial or mining projects, for which the financial benefits can be much higher

than those associated with sustainable timber harvesting. In this new context, MFM could increase the economic benefits of SFM. Several initiatives, such as certification and legality schemes, could help support the implementation of MFM, although generally forest management certification has so far failed to yield significant increases in timber prices.

OVERVIEW OF MANAGEMENT OBJECTIVES AND OUTPUTS

Tables 6, 7 and 8 present a synthesis of the management outputs of surveyed initiatives in each of the target regions. It shows that, in terms of economic outputs, timber production remains by far the main primary objective, followed by the production of NTFPs. Four-fifths of the initiatives combine both uses. For those initiatives in the Amazon, a first observation is the importance of palms. Palm species are indeed key livelihood resources in Amazonia, where they are ubiquitous and, in many cases, naturally abundant. Palms have a diversity of uses and are essential food sources for wildlife. Some have high economic value and are therefore managed for increased production (Porro and Cotta, 2009). The combination of NTFP production and ecotourism is also relatively common among the surveyed initiatives, in all cases involving indigenous communities, often in partnership with private operators.

Fisheries are important in the Amazon, and three of the initiatives include fish production in their management objectives. Traditional communities in the region have developed promising integrated management practices and techniques to ensure fish production and forest conservation (e.g. McGrath *et al.*, 1993). In Southeast Asia, the production of fuelwood and charcoal is important in forests managed by communities. Ecotourism is a secondary management objective in some initiatives (in Indonesia, Malaysia and the Philippines), often linked with the production of NTFPs (e.g. rattan from the Calamoideae subfamily of palms). Relatively little information was available on the identified initiatives in the Congo Basin, likely reflecting difficulties in incorporating NTFPs and ecosystem services in industrial-scale forest concessions (Lescuyer *et al.*, 2012).

TABLE 6
Main outputs of selected MFM cases in the Amazon Basin, with indication of the responsible entity for management decisions

Main outputs	Initiative[a]														
	Brazil						Peru							Bolivia	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Management responsibility[b]	C	C	C	G	C	C	C	C	C	C	C	C	C	C	C
Forest certification[c]	-	x	x	x	-	-	-	-	-	-	-	x	x	x	-
Wood production															
timber	X	X	X	X	X	X					X	X	X	X	X
roundwood – poles (e.g. for construction)							X								
fuelwood/charcoal											X				
Non-wood production															
alms (fibre, fruits, seeds, leaves), including rattans	X		X			X	X	X	X	X	X	X	X	X	
fruits, nuts		X	X	X	X			X					X	X	X
latex, resins and exudates		X	X	X	X									X	
oils	X	X	X												
medicinal plants							X								
bamboo and vines					X										
Wildlife management and conservation															
wildlife management (e.g. peccaries – *Tayassu* spp.)								X							
(Restoration of) hunting wildlife species															
wildlife conservation															
Agroforestry								X	X						
Fisheries (artisanal and commercial fisheries)							X	X					X		
Ecotourism/recreation					X	X		X	X	X	X				
Biodiversity conservation									X						
Landscape restoration/ forest rehabilitation									X						
Ecosystem conservation (e.g. white-sand forests)							X								
Soil and water conservation (e.g. water supply, protection of headwaters)								X							
Carbon storage and sequestration								X					X		
Protection of sites of special cultural, religious or archaeological importance															

Notes: [a] 1 = Tapajos National Forest – Projeto Ambé; 2 = Chico Mendes PAE – Seringal Cachoeira; 3 = Porto Dias PAE; 4 = Antimari State Forest; 5 = Uatumã RDS; 6 = Mamirauã RDS; 7 = Alto Nanay-Pintuyacu-Chambira *área de conservación regional*; 8 = Comunal Tamshiyacu Tahuayo *área de conservación regional*; 9 = Matsés indigenous community; 10 = Veinte de Enero community; 11 = Río Momón Basin; 12 = Junín Pablo community; 13 = Pueblo Nuevo del Caco community; 14 = SAGUSA Pando forest concession; 15 = Tahuamanú company and communities of Puerto Oro and Nuevo Belén. [b] C = community; G = government/state; P = private company; [c] X indicates that an output applies in the given initiative.

TABLE 7
Main outputs of selected MFM cases in Southeast Asia, with indication of the responsible entity for management decisions

Main outputs	Initiative[a]																						
	Cambodia	Lao PDR*	Indonesia										Malaysia					Philippines			PNG[c]	Viet Nam	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Management responsibility[d]	C	C	P	P	G	P	P	P	P	P	P	P	G	G	G	P	P	P	C	C	C	P	G
Forest certification[e]	-	X	X	-	X	X	X	X	X	X	X	X	X	-	-	X	-	-	-	-	-	-	-
Wood production																							
timber		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
roundwood – poles	X																						
fuelwood/charcoal	X				X								X	X					X	X	X	X	
Non-wood production																							
palms, including rattans		X	X	X		X	X	X	X	X	X	X			X	X		X	X	X	X		
fruits, nuts	X																						
latex, resins and exudates					X																		
oil																							
medicinal plants													X										
bamboos and vines													X										X
Wildlife management and conservation																							
wildlife management																							
(Restoration of) hunting wildlife species																							
wildlife conservation																							
Agroforestry																							
Fisheries resources (artisanal and commercial fisheries)														X								X	

Ecotourism/recreation					X				X				X	X			X			X		X	
Biodiversity conservation	X			X	X	X							X		X	X	X	X		X			X
Landscape restoration/forest rehabilitation					X								X				X		X	X			
Ecosystem conservation (e.g. white-sand forests)																							
Soil and water conservation (e.g. water supply, protection of headwaters)	X		X	X	X	X							X		X		X	X	X	X			X
Carbon storage and sequestration				X																X			
Protection of sites of special cultural, religious or archaeological importance					X	X											X		X	X			

Notes: [a] 1 = Bos Thom and other communities in Siem Reap; 2 = SUFORD project, Dong Phousoi and Dong Sithouane; 3 = PT Diamond Raya; 4 = Berau Forest Carbon Programme; 5 = Perum Perhutani; 6 = PT Erna Djuliawati; 7 = PT Narkata Rimba; 8 = PT Roda Mas Timber Kalimantan; 9 = PT Sari Bumi Kusuma; 10 = PT Suka Jaya Makmur; 11 = PT Belayan River Timber; 12 = PT Kemakmuran Berkah Timber; 13 = Deramakot; 14 = Matang mangroves; 15 = Model Forest Management Area Sarawak; 16 = Kumpulan Pengurusan Kayu Kayan Terengganu Sdn. Bhd.; 17 = Tama Abu and Suling-Selaan; 18 = SUDECOR (Surigao Development Corporation); 19 = Ifugao muyongs; 20 = Batangan Forest; 21 = FPCD; 22 = Loc Bac State Operating Company; 23 = DakTo Forestry Company ; [b] Lao People's Democratic Republic; [c] Papua New Guinea; [d] C = community; G = government/state; P = private company; [e] X indicates that an output applies in the given initiative; * Lao People's Democratic Republic.

TABLE 8
Main outputs of selected MFM cases in the Congo Basin, with indication of the responsible entity for management decisions

Main outputs	Initiative[a]							
	Cameroon			Gabon		Democratic Republic of the Congo		
	1	2	3	4	5	6	7	8
Management responsibility[b]	P	P	C	P	P	P	P	C
Forest certification[c]	X	X	-	X	-	X	-	-
Wood production								
timber	X	X	X	X	X	X	X	X
roundwood – poles								
fuelwood/charcoal								
Non-wood production								
palms (fibre, fruits, seeds, leaves), including rattans			X					
fruits, nuts								
latex, resins and exudates								
oil								
medicinal plants								
bamboo and vines								
Wildlife management and conservation								
wildlife management								
(restoration of) hunting wildlife species								
wildlife conservation								
Agroforestry	X							
Fisheries resources (artisanal and commercial fisheries)								
Ecotourism/recreation								
Biodiversity conservation								
Landscape restoration/forest rehabilitation								
Ecosystem conservation (e.g. white-sand forests)	X							
Soil and water conservation (e.g. water supply, protection of headwaters)								
Carbon storage and sequestration								
Protection of sites of special cultural, religious or archaeological importance								

Notes: [a] 1 = TRC – UFA 00 004; 2 = ALPICAM – UFA 10 51; 3 = COPAL; 4 = CEB–Precious Woods – Bambidie and Okondja; 5 = IBNG – Kango; 6 = SIFORCO – Bumba; 7 = SODEFOR – Mai Ndombe; 8 = Mubala (Indigenous community association); [b] C = community; G = government/state; P = private company. [c] X indicates that an output applies in the given initiative.

CONSTRAINTS ON MFM IMPLEMENTATION

Table 9 presents a synthesis of the available information from the selected initiatives about the main factors constraining the implementation of MFM. Policy and institutional constraints appear to be major obstacles in all three regions. Economic and financial constraints are also of major concern to community and private-sector MFM initiatives in the three regions. Of the listed social and technical constraints, a lack of organizational, administrative and technical human resource capacities is common to all three regions.

TABLE 9
Factors constraining or limiting MFM in the three regions

Constraint factors/issues	Amazon Basin	Southeast Asia	Congo Basin
Political and institutional constraints			
Illegal logging and encroachment	X[a]	X[b]	X
Inadequate legislation	X[c]	X	X
Government interference – requirements and bureaucracy (e.g. cumbersome procedures and delays in the approval of FMPs)	X[d]	X	X
Conflicts with local (indigenous) people over land rights and claims for compensation (use rights)	X	X	X
Lack of long-term tenure security	X	X	
Infrastructure development (e.g. roads, hydropower plants) leading to forest conversion (e.g. oil palm, timber plantations, coal mining)	X	X	
Lack of government support for local value-added processing of forest resources	X	X	
Lack of rights on forest resources for indigenous and local communities			X
High government royalties or tax payments in relation to sales income		X[e]	
Economic and financial constraints			
Lack of economic profitability of implementing MFM	X	X	X
Unfair competition from low-priced illegal wood products	X	X	X
Low prices for forest products/low income from timber sales for community forestry products (e.g. poles)/very low price premium for certified timber	X	X	X
Poor access to markets (e.g. due to poor transport infrastructure)	X	X	X
Financial constraints/low funding for forest management from financial agencies	X	X	X
Lack of economic or financial incentives	X		
Lack of economic information – prices, demand, markets, production forecasts	X		
Lack of or inadequate marketing strategy for forest products	X		
Lack of processing machinery for product value-adding	X		
Social and technical constraints			
Insufficient personnel for SFM implementation/limited human resources capacity/lack of skilled personnel	X	X	X
Community weaknesses in the areas of negotiation, human-resource management and marketing	X		X
Insufficient community training in productive activities and business management	X		X
Poor supervision and control of logging and forest management operations in general	X	X	
Lack of or poor consultation (by private companies or the forest administration) with local stakeholders		X	
Lack of/low incentives (e.g. for RIL operations)		X	
Poor forest condition – overharvesting and high logging damage		X	
Deficiencies in road planning, construction and maintenance	X	X	
Poor implementation of RIL techniques		X	
Overestimation of forest growth rates		X	
Lack of technical/silvicultural information (particularly on NTFPs)	X		
Lack of a system or procedures for incorporating monitoring results into FMPs		X	

Notes: [a] e.g. occupation of unauthorized squatters in part of the forest concession, or invasion by *barraqueros* (owners of rubber-forest estates), who illegally remove the nuts; [b] a high population density outside the forest has led to encroachment and illegal logging; [c] e.g. the requirement to prepare and submit an FMP for each product to be harvested; [d] e.g. the difficulties posed by employees of the regional forestry administration, who impede the normal conduct of activities; [e] these payments are usually higher than the sale price for wood products (e.g. poles in Cambodia).

KEY VARIABLES INFLUENCING MFM IMPLEMENTATION

Considering the barriers and bottlenecks affecting the implementation of MFM, it is clear that major shifts in policies and institutional arrangements and on various economic, social and technological fronts are needed if MFM is to become more widespread. The data gathered from the 46 initiatives in which some form of MFM is being practised at the FMU level are insufficient for a definitive conclusion on the circumstances or conditions by which MFM can be implemented successfully. Nevertheless, some of the key variables are set out below.

Forest tenure and use rights, and responsibility for management decisions

Of the 46 initiatives surveyed, forest tenure and use rights are well defined or at least not identified as a constraint in only two cases. Most MFM initiatives are based in local communities, often assisted by external entities such as NGOs and governments.

Forest condition

The majority of MFM initiatives take place in production forests that have been logged but retain their original structure. This means that the potential for MFM is relatively high. Sometimes it is the abundance of a particular valuable resource that matters most for product diversification, as seen in forests with a relatively high abundance of Brazil nut trees or *Mauritia* groves in the Amazon and *mubala* in the Democratic Republic of the Congo.

Management objectives and outputs

There are clear indications that the legal framework in most of the countries analysed either hampers or inhibits MFM. Although, in most countries, MFM is mentioned in legal frameworks, in practice it is often ignored, thus making it difficult to formalize multiple-use approaches. A few reasons for this can be identified. First, there is still a bias towards timber and a lack of clarity on NTFPs in legal frameworks, which hinders the approval of management plans that include NTFPs. In addition, national regulations in several countries require the preparation of management plans for every non-timber forest species to be harvested and commercialized. Other objectives, such as ecotourism and wildlife management, also require separate plans, and diversified management options are not explicitly encouraged. There is a lack of institutional and financial incentives for long-term private investment, and norms for small producers are the same as those applied to medium-to-large businesses, which generally have a much greater capacity to comply. The restrictive and punitive approaches of most legal frameworks, with their emphasis on prohibitions, clearly hinder the implementation of MFM. Legislation is therefore needed that helps realize the potential of forests for MFM by encouraging the development of diverse forest uses and expanding the benefits obtained from them.

Forest certification

MFM initiatives are strongly associated with certification: half the surveyed initiatives have certified their timber-related forest management and two have certified NTFPs (Brazil nuts and copaiba oil). In Southeast Asia and the Congo Basin, most certified operations are managed by private companies in forest concessions, while in the Amazon the certified operations are community-based. An observation on these regional differences is that the inclusion of one or more non-timber outputs in the FMPs of certified forest concessions might be related to the certification requirements for community participation in the benefits of forest management (i.e. communities within the concession area are free to use the forest in a traditional manner). The process of obtaining FSC certification has increased MFM in forest concessions in the Congo Basin. The situation in the Amazonian context is different: with more favourable tenure and forest-use rights, communities are the protagonists of MFM initiatives, and certification – in all cases with strong external support – is part of marketing strategies.

Value-added and economic benefits

Product value-adding and the economic benefits obtained from MFM are related. Deficits of both are among the main constraints faced by MFM initiatives in general and particularly those involving communities. One way to overcome deficiencies in value-adding and economic benefits in local communities is to establish partnerships or other kinds of arrangement with the private sector. This has happened in several surveyed initiatives, and it is clear from published studies and the information gathered in this study that such arrangements are indeed an important factor facilitating the implementation of MFM (see also Box 1). In all three regions, initiatives have made efforts to add value through processing and marketing in the following ways:

- capacity-building activities
    - timber harvesting techniques and processing
    - techniques of tapping and processing of latex into sheets
    - business management;
- technical assistance
    - primary processing of timber to improve production and product value-adding
    - veneer manufacturing from small logs;
- processing of NTFPs
    - charcoal production in kilns
    - manufacture of gum resin
    - manufacture of therapeutic products from plants
    - oil extraction and processing (e.g. from *Mauritia*, *Copaifera*)
    - production and export of handicrafts using palm fibres
    - elaboration of thatched roofs from palm leaves
    - production of bio-jewels from palm seeds (e.g. *Phytelephas*)
    - spring water, honey, silk, eggs and cocoons;

- marketing assistance
    - facilitation of business contacts with potential customers
    - working together with organizations experienced in promoting certified timber in export markets to inform and negotiate with buyers
    - supporting the commercialization of forest products, including handicrafts made from wood and natural fibres
    - auction sales of timber from public forests;
- forest certification (in almost all cases for timber and by private companies);
- facilitation of institutional arrangements (e.g. for a wildlife conservation programme);
- project development preparation for income-generation activities;
- research (e.g. on NTFPs for use diversification and value-adding).

Adding value to timber and NTFPs in MFM initiatives is a key area in which much work needs to be done, but significant technical, organizational, financial and institutional constraints remain.

Policy and institutional frameworks

Policy and institutional frameworks are not explicitly described in the surveyed initiatives. Responses to the question "are current policy and institutional frameworks supportive of MFM and, if not, explain why not?" were generally too vague for detailed analysis. In some countries, existing laws have already been noted as an important constraint, but there are indications of recent positive changes. In Brazil, for example, the law determines that forestry in the Amazon should be guided by the multiple-use principle, and there are no norms for NTFPs at the federal level, which reduces unnecessary bureaucracy in the process of obtaining approvals for management plans for multiple uses. In Bolivia (Plurinational State of), current laws and policies create a favourable framework for MFM and promote integrated forest management. They also promote activities to be undertaken by rural and indigenous communities in community forest organizations and processes for the management, processing and marketing of timber and NTFPs in production forest areas.

MOVING FORWARD

What can be done to overcome the current constraints to MFM implementation? What mechanisms, incentives or strategic (policy, institutional and technological) interventions are needed? Table 10 presents proposals for addressing the constraints on MFM identified in the regional assessments and global survey. Governments have a key role to play in creating favourable environments. Development actors (including NGOs) and financial institutions are also keys in actively establishing or supporting strategies and measures to overcome the economic (market), financial, social and technical barriers to MFM, particularly for communities and smallholders.

TABLE 10
Incentives for MFM implementation

Incentives	Responsibility[a]
Political and institutional	
Clarify land tenure and property rights and/or forest resource use rights, including ecosystem services offered at the FMU level	Gov
Formalize and ensure the effective application of customary use rights (e.g. in forest concessions)	Gov
Develop an adequate legal framework that allows the submission of flexible management plans for multiple uses, avoiding current requirements to prepare management plans for each product extracted from the forest	Gov
Design mechanisms to reward decentralized public staff for the full enforcement of national regulations on MFM	Gov
Provide a legal incentive for user rights-holders applying MFM – e.g. priority treatment in approving permits or licences for management and processing activities	Gov
Integrate forest management planning with land-use planning at the local and national scales	Gov
Apply tax cuts and other incentives to facilitate operations for the harvest, use and management of NTFPs in MFM initiatives until they become profitable	Gov
Reduce taxes on management plans that include non-traditional NTFPs and other forest uses to encourage MFM	Gov
Accelerate the formulation of regulations and mechanisms to facilitate the implementation of global initiatives for PES	Gov
Introduce the concept of MFM to international negotiations on climate change and forests in order to take advantage of the incentives offered by REDD+ and forest management initiatives in production landscapes	Gov
Economic and financial	
Promote and provide incentives and finance access to value-added processing of products from managed forests	Gov, fin
Strengthen marketing partnerships for the commercialization of multiple products	Gov, dev
Promote and support new sources of funding – e.g. PES – to broaden the income base of forest management	Gov, fin
Support communities and small-scale producers practising MFM to certify their forest operations	Dev, fin, gov
Allocate funds to support MFM through research, education and training	Gov, dev
Social and technical	
Promote stakeholder inclusion in forest management (planning, implementation, monitoring and evaluation)	Gov, dev
Support capacity development at the organizational and individual levels (e.g. government staff, community user groups, forest technicians/rangers and private managers)	Gov, dev, fin
Train administrators/managers of credit in the needs of the forest sector and MFM in particular	Fin
Provide long-term technical assistance and extension services suited to the breadth and needs of forest managers practising MFM	Gov, dev
Disseminate experiences in other locations and countries and create opportunities for discussion between actors (e.g. government, large and small producers and civil society as a whole)	Dev, gov
Make relevant technical information accessible to forest managers, government officials, NGOs and other actors	Dev, gov
Provide information services on prices and market opportunities for forest producers	Dev, gov
Invest in research on key issues that contribute to the sustainability and successful implementation of MFM	Dev, gov, fin
Include MFM as a theme in the curricula of universities and vocational schools	Gov

Note: Gov = government; dev = development actors, including NGOs; fin = financial institutions.

BOX 1

Company–community partnerships

Company–community partnerships in forestry are active agreements for the production of forest goods and services in which the parties share benefits, costs and risks with the expectation of mutually beneficial outcomes (World Bank, 2009). This form of institutional innovation can provide a way of overcoming common challenges, such as those related to access to capital and technology, as well as commercial opportunities for the favourable integration of small and medium-sized forest enterprises into supply and value chains to generate income (Katila *et al.*, 2010). While there are success stories in company–community partnerships in tropical forests and in the Amazon region in particular, there are also experiences that show that such arrangements are subject to a range of problems, disappointments and risks.

Partnerships between companies and communities make sense because they can capitalize on complementary strengths by fostering strategic relationships between actors. Companies have capital and logistics, extensive knowledge of market behaviour, and negotiation skills, but they are finding it increasingly difficult to source products sustainably; communities have resources, and knowledge about their use and extraction (particularly in relation to NTFPs), but no capital, and they lack experience with the market and access to market opportunities.

Nevertheless, partnerships between companies and communities in other sectors have rarely inspired confidence and are often criticized from various angles. The relationship is often asymmetric because companies manage the market information and have better access to it, and companies are often at a significant advantage in negotiations with communities. Company–community agreements therefore have many risks. One risk is to the sustainability of forest-product extraction when a product becomes commercial, because the pressures for overexploitation are great. Also, communities may not receive the value they deserve for their products, and if they are dissatisfied with an activity it is likely they will resist other initiatives that might be more successful in the future. Such commercial agreements may not sufficiently take into account or correspond with the social needs of communities, where money is just one aspect of their motivation and the main concern is to ensure social welfare and security over their territories and resources (e.g. Gasché, 2010). In contrast, the interest of companies is basically to ensure the supply of raw materials and there is no real concern for local issues.

Some of the conditions for fair and effective partnerships between companies and communities that could promote MFM are:

- a company with proven social and environmental responsibility, willing to develop local capacities and to favour the marketing of products under management;
- a sufficiently skilled community – knowing what the community has, what it wants, and how much of the resource should be subject to the agreement – so the community can negotiate fair agreements;
- clearly specified rights and duties for each party;
- transparency during the whole process, from negotiation to implementation and the monitoring of agreements;
- a policy favouring effective agreements (e.g. a minimum pricing policy for products to be extracted from the forest);
- good legal assistance/support;
- regulatory arrangements made through a third party, supervised by some sort of community oversight mechanism;
- supervision by third parties to prevent abuses by either party – the preference is for the state to participate as an intermediary and to oversee negotiations.

INFORMATION NEEDS AND RESEARCH GAPS

Information needs identified during this study (particularly in the regional assessments) relate to:

- the potential of the forest for multiple-use management, including inventories of timber stocks, NTFPs, wildlife and ecosystem services;
- the estimation of sustainable supply, harvesting times, frequency and production quantities of major NTFPs;
- the traditional management of species of interest in MFM systems;
- the economic viability of harvesting species with market potential;
- technical indicators of species production under varying local conditions and harvesting modes, including the effects of selective logging on NTFP yields;
- commercial prices for timber and NTFPs (with continuous updating);
- the description and quantification of forest resource chains of custody, including the distribution of added value;
- integrated FMPs;
- business plans for forest products of high economic potential;
- the technologies and practices in use by communities involved in MFM and the systematization of experiences;
- demonstration programmes for training and extension on MFM;
- programmes and incentives policies for MFM;
- funding sources (national and international) for MFM and how to access them;
- the socio-economic viability of MFM initiatives.

The regional assessments identified the following research gaps:

- inventories of NTFPs and traditional uses, ;
- the ecology and silviculture of non-timber forest species;
- interactions in the harvesting of various timber and non-timber forest species;
- determination of the cutting cycles for species used in MFM systems;
- optimization of management techniques for timber and non-timber forest species for increased scale (volume), diversification of products (use of new species with appropriate characteristics) and reduction of production costs;
- innovative techniques for processing products and co-products of timber and NTFPs;
- the economic feasibility of integrating the management of timber and non-timber species;
- production chains for species of greatest potential;
- the systematization of technical information generated in productive activities and relevant MFM initiatives.

RECOMMENDATIONS

Forest managers should be targeted with support to realize the potential of adopting additional management objectives. Ideally this would be done at the FMU level but could also be done through national meetings of forest managers. Greater effort is needed to eliminate unfair competition from operators whose sole objective is to extract timber, with little or no concern for multiple uses such as NTFP production, social welfare or the provision of ecosystem services. Such unfair competition could be tackled through legal means that, for example, require evidence of forest legality and the mandated implementation of criteria and indicators for SFM, harvesting codes of practice and forest certification. In most countries, the demarcation of a PFE and development of national land-use plans would increase investment in long-term forest management and lend support to MFM. Improving the value of logged-over forest through silvicultural treatments such as enrichment planting would improve the chance of these forests being managed for multiple uses. Training and awareness-raising to address the entrenched mindsets of some existing forestry stakeholders would also help.

Recommendations to promote the implementation of MFM systems are:

- Develop and implement a policy based on a coherent and well coordinated set of government proposals to benefit rural producers working in sustainable MFM; for example, consider establishing a policy of minimum prices for a set of products coming from community and smallholder MFM areas.
- Develop and implement consistent laws for MFM that facilitate its adoption and sustainable development.
- Strengthen the organization and managerial capacities of communities and smallholders.
- Design and implement strategies and incentives to add value to forest products produced under MFM.
- Promote and support multiple-use forest inventories in preparing FMPs.
- Consolidate multidisciplinary technical teams in support of MFM implementation.
- Facilitate access to adequate credit lines for the development of MFM activities.
- Promote recognition of the value of forest-based traditional practices through exchanges of experiences.
- Increase research on the ecology of timber and non-timber forest species in the context of MFM.
- Reduce taxes on products, especially NTFPs, produced in community and smallholder MFM areas.
- Strengthen company–community partnerships for MFM.
- Strengthen efforts for the wider and more effective dissemination of relevant (technical, economic and legal) information and results of experiences and research to assist the implementation of MFM.

- Promote the replication of successful MFM experiences.
- Establish and maintain communities of practice on MFM as a way to gain and disseminate appropriate knowledge, information and experiences on MFM implementation. To this end, a database of cases of MFM in varying contexts in the tropics could be assembled, disseminated and used through networks of people interested in expanding the database and promoting information exchanges, field visits, and the systematization of experiences and lessons.

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ANNEX 1

Database structure of MFM initiatives

	Country	
1	**Name of the initiative**	**How the initiative is known (i.e., name of the group, association, company, individual, etc.)**
2a	Location	Information on administrative location (e.g. state, department, province, municipality, district)
2b	Coordinates (longitude and latitude)	Longitude and latitude of the place where the initiative is located
3a	Initiation and termination dates	Start year of the initiative and end year if finished
3b	Stage of the initiative	Ongoing or terminated
4	Total area	Total area covered by the initiative, expressed in hectares
5a	Area under MFM	Forest area effectively being managed for multiple-use, expressed in hectares
5b	Scale of the initiative / intervention	Possible options: pilot/experimental or demonstration scale; small- to medium scale, large/industrial scale
6	In what kind of forest is the initiative located[1]	Reference to the forest formation, ecozone or forest type as it is known in the region or country, e.g.: • (sub) tropical humid/moist/rain forest, (sub) tropical deciduous forest, (sub) tropical dry forest, (sub) tropical mountain forest... • evergreen humid/moist/rain forest, mixed deciduous forest, dry forest... • dipterocarp forest, mangrove forest, swamp forest, bamboo forest...
7	What condition is the forest in?	Main forest type(s) in the area under management. Possible options: primary forest (includes areas where just collection of NTFP occurs), logged-over forest, secondary/second-growth forest, degraded forest, regenerating forest, mosaic
8a	Tenure: Who owns the forest?	Legal tenure or ownership of the land where the initiative is located. Possible options: public, communal, private, other (specify)
8b	How long is the tenure period?	
9	Who has access to the forest land and who has rights to use the forest?	Type of access rights for forest resource use in the initiative. Possible options: public (national/state government or local/municipality), concession, communal (collective rights), private, other (specify)
10	Who is directly responsible for management decisions?	Possible options: forest dependent/indigenous people, rural community/association, smallholders, government (local/regional/national), private investors, private company/industry, other (specify)

11a	External support: What sources of external support does the initiative receive?	
11b	For how long will external support continue?	
12	What is the initiative's main objective?	Possible options: rural development/support for subsistence livelihoods and income generation (income, food security, source of products for household use, risk protection, provision of environmental services, etc.); income generation for a timber-based operation; environmental conservation/protection...
13	What are the initiative's main outputs?	Possible options: Timber production, NTFP production, fuelwood and/or charcoal production, soil and water conservation, ecotourism/recreation, landscape restoration/forest rehabilitation, biodiversity conservation, protection of sites of special cultural, religious or archaeological importance; carbon storage/ sequestration, other(s) (specify)
14a	Management: How was the forest management plan prepared, by whom and what are the objectives?	
14b	What are the dominant commercial species and what proportion of the total stock do these constitute in volume terms?	
14c	What logging/ extraction techniques are used?	
14d	How is production regulated in technical and institutional terms?	
14e	Is the commercial productivity of the forest being maintained?	
14f	How and by whom is the initiative monitored?	
15	Forest certification	Yes (when) or no
16a	Income and benefits: What actual or perceived benefits are associated with the initiative in economic, social and environmental terms?	
16b	What efforts are undertaken to add value to forest products through processing and/ or marketing?	
16c	How are economic benefits shared amongst stakeholders?	
16d	Are revenues expected to meet running costs in the long-term?	
17a	Constraints: Are current policy and institutional frameworks supportive of MFM and if not explain why not?	
17b	What are the main factors that constrain or limit the initiative?	
18a	Investment: What is the approximate value invested in the initiative (US$)?	
18b	From what source was the investment derived?	
18c	With what were the main investments associated?	Possible options: land purchase, salaries/wages, timber harvesting equipment, technical assistance, processing equipment, capacity building/training, community/ village development
19	REDD+ potential: Is there a potential role for REDD+ or any other payment mechanisms in supporting the initiative?	
20	Source(s)	
21	Contact(s)	Provide name, position and contact details (phone number, e-mail, address) of a contact person for this initiative
Comments:		

1 As a reference, the following ecozones or forest formations were considered: Tropical rainforest, Tropical moist deciduous forest, Tropical dry forest, Tropical mountain forest, Subtropical humid forest, Subtropical dry forest, Subtropical mountain forest, Mangrove forest, Bamboo forest.

ANNEX 2
Survey questionnaire

INTRODUCTION TO THE QUESTIONNAIRE

Dear Sir/Madam,

We are conducting a survey to obtain baseline information on barriers hindering the implementation and viability of multiple-use forest management (MFM) in the humid tropics. We would greatly appreciate that if you are directly or indirectly involved in MFM initiatives (e.g. activities, projects, studies), you would share your experiences and views through a web questionnaire at https://www.surveymonkey.com/s/MFMENG. Or if you know someone who is involved in MFM initiatives, please forward this message.

The survey will take at most 15 minutes of your time. Please complete the questionnaire at your earliest convenience but latest by 30th April 2011. The results of the study will be disseminated back to you later this year.

Thank you in advance for your time and effort.

With kindest regards,

Sini Savilaakso and Manuel Guariguata
Center for International Forestry Research (CIFOR)
Cesar Sabogal
United Nations Food and Agriculture Organisation (FAO)
Plinio Sist
Centre de Coopération International en Recherche Agronomique pour le Développement CIRAD)

RESEARCH QUESTIONS THE QUESTIONNAIRE IS SUPPOSED TO ANSWER:

- What are the common MFM strategies in tropical forests?
- What are the main barriers impeding the implementation and viability of MFM in the tropics?
- Do barriers differ between different spatial scales or management objectives?
- Do different stakeholders perceive barriers differently?

A. MULTIPLE-USE FOREST MANAGEMENT (MFM) INITIATIVES

1. Name of the initiative/project you are involved in:
2. How are you involved in the initiative/project (e.g. forest manager, researcher, NGO / development)?

3. Location of the initiative/project
   - ○ State/province _____
   - ○ Country _____
4. Is the initiative/project ongoing?
   - ○ Yes, please provide the number of years it has been going on _____
   - ○ No, please provide the number of years it was going on _____
5. Please provide the size of the area under MFM in hectares in the correct box. If you do not know the size, please indicate "NA" (for information not available) in the correct box.
   - ○ Experimental (pilot / demonstration plots) _____
   - ○ Operational, small-scale (less than 500 ha) _____
   - ○ Operational, large-scale ____
6. What type of land tenure does the area have? Only one choice.

Communal land	Government-managed forest	Industrial private concession
Community concession	Indigenous land / territory	Private forest

7. Does the initiative have a management plan? Only one choice.
   - ○ Yes, formal (government approved)
   - ○ Yes, informal
   - ○ No
8. What are the management objectives of the area? Mark only one box for the primary economic output. Several boxes can be marked for secondary activities.

Biodiversity conservation (including forest genetic resources)	Non-timber forest products Soil and water conservation
Carbon storage	Timber production
Fuelwood	Tourism and recreation
Hunting	

9. Does the MFM occur in the whole area under management or are different uses separated to different areas?
   - ○ Whole area is under MFM
   - ○ Part of the area is under MFM but different uses also occur in separate areas
   - ○ Separate areas for different uses
10. Is the area certified for management practices (certification for chain of custody excluded)?
   - ○ Yes, please specify the certification body _____
   - ○ No, but in the process to become certified. Please specify the certification body _____
   - ○ No

11. Jump question related to above:
    Please specify the products that the area is certified for or in a process to be certified for:

Ecosystem services	Timber
Non-timber forest products	Tourism

B. BARRIERS TO MULTIPLE-USE FOREST MANAGEMENT

In the context of your initiative/project, what are/have been the factors hindering multiple-use forest management (MFM)? Please rank each factor according to the following:

1 = Strong barrier	4= Not a barrier
2 = Moderate barrier	5 = Not relevant to my initiative
3 = Somewhat a barrier	6 = Don't know

ECONOMIC_

12. Physical access to markets (e.g. distance, road condition)
13. Influence of product prices or payments for environmental services on decision to engage in MFM
14. The cost of an alternative that was given up to pursue MFM (i.e. opportunity costs)
15. Access to get credit / access to financial resources (e.g. conditions to get a loan)

TECHNICAL

16. Knowledge about the forest resources (e.g. what is in the area and possible uses)
17. Ecological and silvicultural knowledge (e.g. knowledge about the species and their growth requirements; impact of specific management practices on different forest goods / services)
18. Technology-related knowledge and access to it (e.g. tools, processes)
19. Market-related knowledge and access to it (e.g. different markets, prices and conditions)
20. Availability of trained / skilled human resources
21. Access to extension service / support (e.g. activities of educating or instructing; activities that impart knowledge or skill)

SOCIO-CULTURAL

22. Resources, knowledge, and skills to accomplish diversification of the forest management
23. Stakeholder involvement, dialogue to promote and implement multiple use
24. Concerns and/or social conflicts about the impact of one management option to other products / services
25. Negotiation capacity (Stakeholders' capacity to influence decision making

and resolve conflicts)

26. Gender participation / involvement
27. Distribution of economic benefits among stakeholders
28. Community-enterprise interaction

POLICY / INSTITUTIONAL

29. Efficiency of administrational processes
30. Legal framework regarding MFM (The extent the legal framework in your country supports / hinders practicing MFM, e.g. incompatible / compatible forestry laws)
31. Security of land / resource tenure (The extent land /resource use rights make it possible to practice MFM
32. Institutional or management structures and frameworks (e.g. interagency coordination; complicated administrative processes for different products / services)
33. Forestry education (State, availability and amount of forestry education in the country where the initiative is located)

C. RECOMMENDATIONS

What recommendations do you have to enhance the chances of success of MFM initiatives/projects in your region / country?

D. IDENTIFICATION

Please provide some background information about yourself

34. What is your sex?
    - ○ Male
    - ○ Female
35. What is the highest level of education you have completed? Mark only one box.

No schooling completed	Secondary school	MSc
Primary school	BSc	PhD

36. What is your current occupation?

Academic / researcher	Government official
Community/association representative	Officer at international organization / NGO
Decision / policy maker	Other, please specify _____
Forest manager	

37. Where do you currently work?

Academia	International organization	Private sector
Government	NGO	Other, please specify_____

38. How many years of experience in the forestry sector do you have?
    - ○ In which country do you currently work?

ANNEX 3
Analysis of survey questionnaire

The information about the MFM initiatives and the background of respondents was summarized. To analyze the variables that may hinder MFM respondents' answers in regard to the strength of the variables were coded on a scale of 1 to 4 where 4 marked the strongest barrier. In addition, "Don't know" and "Not relevant to my initiative" were coded as 0. Afterwards a factor analysis was performed to reduce the number of variables for further analysis. The application of the factor analysis was justified based on the Bartlett test of sphericity (χ^2 = 816.2, *df* = 231, *P* = 0.001) and the Kaiser-Meyer-Olkin measure of sampling adequacy (0.762). Oblique rotation method was selected as it can be assumed that factors hindering MFM are correlated in the real world.

In the factor analysis the original variables (n=22) formed six factors based on the Eigen values (larger than 1), a screen test and the variance explained (more than 60%). All variables in the analysis had communalities of more than 0.5. After the factor analysis summated scale variables were created based on the average score of the variables loading high on each factor (Table 1). As the new variables proved reliable based on item-to-total correlations and inter-item correlations, they were used in the further analysis. The created variables were non-normal so the Kruskal-Wallis test was performed to see whether differences exist between the regions and between the scales of initiatives.

TABLE 1. NEW VARIABLES FORMED IN THE FACTOR ANALYSIS

New variable	Number of original variable	Explanation of the original variable
Social	14	Negotiation capacity
	12	Stakeholder involvement
	13	Social conflicts about the impact of one management option to other products or services
	16	Distribution of benefits among stakeholders
	15	Gender participation or involvement
	17	Community-enterprise interaction
	20	Security of tenure
Economic	3	Opportunity costs
	4	Access to credit or financial resources
	2	Influence of product prices or PES on decision to engage in MFM
Policy	19	Legal framework
	18	Efficiency of administrative processes
	21	Institutional or management structures and frameworks

	22	Forestry education
Knowledge and skills	9	Availability of trained personnel
	10	Access to extension service or support
	11	Resources, knowledge and skills to accomplish diversification of the forest management
Silvicultural knowledge	5	Knowledge about forest resources and services
	6	Ecological and silvicultural knowledge
	7	Technology-related knowledge
Markets	1	Access to markets
	8	Market-related knowledge

Inductive qualitative analysis was used to categorize the respondents' recommendations on how to enhance the chances of success of MFM initiatives in their region or country. After initial coding, sensitizing concepts were used moving from broad categories (policy, social, technical and economic) to more narrowly defined categories such as "implementation", "community", and "financing".

Annex 4

Summary table of selected MFM cases

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
AMAZON BASIN (N =15)								
1	Brazil	Tapajos National Forest – Ambé Project	Municipality of Belterra, Para State	544 927 (32 587)	Community cooperative	Timber; NTFP production: seeds of andiroba (*Carapa guianensis*) and oil from copaiba (*Copaifera* spp.) and piquiá (*Caryocar* sp.). NTFP production is carried out by different communities that are not included in the Ambé project	2005	No
2	Brazil	PAE Chico Mendes – Seringal Cachoeira	Municipality of Xapuri, Acre State	24 898 (2 400)	Community association	NTFP production: Brazil nuts from *Bertholletia excelsa*, latex from rubber trees, *Hevea brasiliensis*, and oil from *Copaifera* spp.); timber	2000	Yes (2002)
3	Brazil	PAE Porto Dias	Municipality of Acrelandia, Acre State	22 145 (2 854)	Community association	Timber; NTFP production: Brazil nuts from *Bertholletia excelsa*, latex from rubber trees (*Hevea brasiliensis*), forest seeds, and copaiba oil (*Copaifera* spp.)	2000	Yes (2002) Copaiba oil, 2003
4	Brazil	Antimari State Forest	Municipalities of Bujari and Sena Madureira, Acre State	83 807 (66 345)	State government	Timber; NTFP production: collection of Brazil nuts (*Bertholletia excelsa*) and latex from rubber trees (*Hevea brasiliensis*)	1988	Yes (2005)

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
5	Brazil	RDS Uatumã	Municipalities of São Sebastião do Uatumã and Itapiranga, Amazonas State	424 430	State government	Timber (planks); NTFP production: titica vine (*Heteropsis* off. *Spruceana*), fruits and exudates; cultural tourism; traditional extractive activities (hunting, fishing)	2004	No
6	Brazil	RDS Mamirauã	Municipalities of Alvarães, Uarini, Maraã, Fonte Boa and Jutaí, Amazonas State	1 124 000 (97 400)	State government	Timber; NTFP production; ecotourism	1996	No
7	Peru	ACR Alto Nanay-Pintuyacu-Chambira	Districts of Mazán and Alto Nanay in Maynas province and Tigre district in Loreto Province, Department of Loreto	954 635	Community	Timber (roundwood for construction); NTFP production: palm leaves from irapay (*Lepidocaryum tenue*), fibres from chambira (*Astrocaryum chambira*), seeds from yarina (*Phytelephas macrocarpa*) to make handicrafts, and medicinal plants to prepare therapeutic products; artisanal and commercial fisheries; ecosystem conservation (white-sand forests – *varillales*)	2011	No
8	Peru	ACR Tamshiyacu Tahuayo	Districts of Fernando Lores (Maynas Province), Yavarí (Mariscal Castilla Province), Sapuena and Yaquerana (Requena Province), Department of Loreto	420 080 (220 400)	Community	NTFP production: fruits of the palm aguaje (*Mauritia flexuosa*); leaves of the palm irapay (*Lepidocaryum tenue*); handcrafts with fibres from the palm chambira (*Astrocaryum chambira*); fruits of camu camu (*Myrciaria dubia*); fisheries resources; agroforestry; ecotourism/recreation; water supply (protection of headwaters); 'resources with potential for research; carbon sequestration	2009	No

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
9	Peru	Matsés Indigenous Community	Yaquerana District, Province of Requena, Department of Loreto	512 735	Community	Collection of yarina (*Phytelephas macrocarpa*) fruits; ecotourism; restoration of fish species; restoration of hunting wildlife species; biodiversity conservation	2007	No
10	Peru	Community of 20 de Enero	Nauta District, Province of Loreto, Department of Loreto	1 244	Community	NTFP production: aguaje (*Mauritia flexuosa*) and yarina (*Phytelephas macrocarpa*); ecotourism	1992	No
11	Peru	Rio Momon Basin	Punchana District, Province of Maynas, Department of Loreto	144 100 (5 000)	Community	Timber production (4 000 m3(r)/yr); charcoal (12 500 m3/yr or 37 000 bags/yr); NTFP production: irapay (*Lepidocaryum tenue*) (125 000 thatchs/yr); ecotourism (7 ecotouristic lodges)	2007	No
12	Peru	Community of Junin Pablo	Masisea District, Province of Coronel Portillo, Department of Ucayali	2 550 (2 084)	Community	Timber; NTFP production (palm leaves of bijao – *Calathea lutea*)	2003	Yes (2005)
13	Peru	Community of Pueblo Nuevo del Caco	Iparía District, Province of Coronel Portillo, Department of Ucayali	6 400 (2 500)	Community	Timber production; NTFP for handicrafts and fruits of camu camu (*Myrciaria dubia*); carbon storage and sequestering; fisheries	2003	Yes (2005)
14	Bolivia	SAGUSA Pando forest concession	Municipality of Bella Flor, Province of Nicolás Suárez, Department of Pando	66 087	Private company	Timber; NTFP production: Brazil nuts (castaña, *Bertholletia excelsa*), latex from rubber trees and fruit from the palmito palm (*Euterpe precatoria*)	?	No

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
15	Bolivia	Tahuamanú company and Puerto Oro and Nuevo Belén communities	Municipality of Bolpebra, Department of Pando	undefined	Company-community partnership	Timber; NTFP production: Brazil nuts (*castaña*, *Bertholletia excelsa*)	?	No
CONGO BASIN (N = 8)								
1	Cameroon	TRC – UFA 00 004	Yabassi-Ndikinimeki-Nkodjock, provinces of Nkam, Mbam and Inoubou (Coast line and Centre)	94 917 (92 846)	Private company	Sustainable timber production (FSC-certified); identification of high-conservation-value forests inside the concession; tolerance of NTFP gathering by local people; anti-poaching campaigns organized but not very efficient; agroforestry areas designed in the concession without possibility of expansion	2004	Yes (2008)
2	Cameroon	ALPICAM – UFA 10 51	Ndélélé, Kadey (East)	86 096	Private company	Sustainable timber production for export (according to the FMP); identification of high-conservation-value forest inside the concession; tolerance of NTFP gathering by local people; anti-poaching campaigns organized but not very efficient	1998	Yes (2009)
3	Cameroon	COPAL – Coopérative des Planteurs de la Lékié	Sa'a, Lékié (Centre)	4 800	Community	Production (formal and informal) of timber; production of tradable NTFPs (*Irvingia gabonensis* and *Ricinodendron heudelotii*); according to the community forest's sustainable management plan (validated by the forestry administration)	2008	No

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
4	Gabon	CEB–Precious Woods – Bambidie and Okondja	Lastourville, Akeni, Okonja, Milolé, provinces of Mulundu, Sebe-bikolo and Lekoni-lekori (l'Ogooué lolo and Haut Ogooué)	581 490 (18 588	Private company	Sustainable timber production (FSC-certified); identification of high-conservation-value forest inside the concession; support for NTFP gathering by the local people; anti-poaching campaigns organized but not very efficient	1967	Yes (2008)
5	Gabon	IBNG – Kango	Kango, Komo (Estuary)	20 800 ha	Private company	Sustainable timber production (according to the FMP); identification of high-conservation-value forest inside the concession; tolerance of NTFP gathering by local people; anti-poaching campaigns organized but not very efficient	2004	No
6	Democratic Republic of the Congo	SIFORCO – Bumba	Bumba, Mongala (Equateur)	230 000	Private company	Sustainable timber production (according to the FMP); identification of high-value-conservation forest inside the concession; tolerance of NTFP gathering by local people; anti-poaching campaigns organized but not very efficient	2010	No
7	Democratic Republic of the Congo	SODEFOR – Mai Ndombe	Mai-ndombé, Inongo (Bandudu)	199 900	Private company	Sustainable timber production (according to the FMP); identification of high-conservation-value forest inside the concession; tolerance of NTFP gathering by the local people; anti-poaching campaigns organized but not very efficient	2003	No

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
8	Democratic Republic of the Congo	Mubala (Indigenous community association)	Mai-ndombé, Inongo (Bandudu)	396 523	Community	Collection of mubala seeds by the association; logging company harvests timber and tolerates collection of other NTFPs for own consumption	2009	No
SOUTHEAST ASIA (N = 23)								
1	Cambodia	Bos Thom and other communities in Siem Reap	Siem Reap Province	20 000	Communities and Forestry Administration	Timber (poles); NTFPs (fruits); fuelwood and/or charcoal production; soil and water conservation; biodiversity conservation	1998	No
2	Indonesia	PT Diamond Raya	Riau Province	90 956	Private company	Timber; NTFP production; soil and water conservation	1978	Yes (2001)
3	Indonesia	Berau Forest Carbon Programme	Berau District, East Kalimantan	1 600 000	Private company	Timber + NTFP production + Soil and water conservation + Biodiversity conservation + Carbon storage/sequestration	2006	No
4	Indonesia	Perum Perhutani	Java (and Madura)	2 400 000 (1 750 860)	Government – state company	Timber; NTFP production; fuelwood; soil and water conservation (700 000 ha protected forest); ecotourism/ recreation; landscape restoration/ forest rehabilitation; biodiversity conservation (under forest certification, 10% of natural forest is set aside); protection of sites of special cultural, religious or archaeological importance; social support of production sharing for local community organization	1961	Yes (2001)

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
5	Indonesia	PT Erna Djuliawati	Seruyan, SeruyanHulu, Central Kalimantan	184 206	Private company	Timber; NTFP production; soil and water conservation; biodiversity conservation; protection of sites of special cultural, religious or archaeological importance	1999	Yes (2006)
6	Indonesia	PT Narkata Rimba	East Kalimantan	41 540	Private company	Timber; NTFP production	1989	Yes (2011)
7	Indonesia	PT Roda Mas Timber Kalimantan	East Kalimantan	99 520	Private company	Timber; NTFP production	1973	Yes (2012)
8	Indonesia	PT Sari Bumi Kusuma	Katingan and Seruyan, Central Kalimantan	208 300 (147 600 - Serutan Block only)	Private company	Timber; NTFP production; ecotourism (pilot)	1979	Yes (2005)
9	Indonesia	PT Suka Jaya Makmur	West Kalimantan	171 340	Private company	Timber; NTFP production	2000	Yes (2011)
10	Indonesia	PT. Belayan River Timber	East Kalimantan	97 500	Private company	Timber; NTFP production	1978	Yes (2012)
11	Indonesia	PT Kemakmuran Berkah Timber	Long Pahangai Sub-District, West Kutai District, East Kalimantan	82 810	Private company	Timber; NTFP collection by communities (but not controlled/ managed by the concession)	1987	Yes (2012)
12	Lao People's Democratic Republic	SUFORD project, Dong Phousoi and Dong Sithouane production forests	Khammouane Province (PhouXoy), Savannakhet Province (Sithouane)	327 000 (82 760 ha – FSC-certified)	Community	Timber; NTFP production	1995	Yes (2006)

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
13	Malaysia	Deramakot	Sabah, Sandakan, FMU 19(a)	55 139	State	Timber; NTFP production; fuelwood and/or charcoal production; soil and water conservation; ecotourism/ recreation; landscape restoration/ forest rehabilitation; biodiversity conservation	1961	Yes (1997)
14	Malaysia	Matang mangroves	Perak Province	40 151	State	Timber; fisheries production (mud crabs, cockles, cage culture of sea bass); fuelwood and/or charcoal production; ecotourism/recreation	1902	No
15	Malaysia	Model Forest Management Area Sarawak	Between Bintulu and Sibu, Sarawak	162 500	State	Timber; NTFP production; soil and water conservation; biodiversity conservation	1993	No
16	Malaysia	Kumpulan Pengurusan Kayu Kayan Terengganu Sdn. Bhd.	South Terengganu, Terengganu	108 900	Private company	Timber; NTFP production; biodiversity conservation	1983	Yes (2008)
17	Malaysia	Tama Abu and Suling-Selaan	Baram, Sarawak	100 650	Private company	Timber (the company only extracts round logs from the forest reserve to generate revenue for sustaining the operation); soil and water conservation; landscape restoration/forest rehabilitation; biodiversity conservation	?	No
18	Philippines	SUDECOR	Northeastern Mindanao	75 745	Private company	Timber; soil and water conservation; ecotourism/ recreation; landscape restoration/ forest rehabilitation; biodiversity conservation; protection of sites of special cultural, religious or archaeological importance	1996	No

	Country	Name	Location	Total area (area under MFM) (ha)	Management responsibility	Management outputs	Starting year	Certification (year)
19	Philippines	Ifugao *muyongs*	Ifugao Province	12 252	Communities	Timber; NTFP production; soil and water conservation; biodiversity conservation	Traditional practice	No
20	Philippines	Batangan Forest	Municipalities of Sagada, Besao and Tadian, Mountain	43 618	Communities	Timber; NTFP production; fuelwood; soil and water conservation; ecotourism/ recreation; landscape restoration/ forest rehabilitation; biodiversity conservation; protection of sites of special cultural, religious or archaeological importance; carbon storage/sequestration	1996	No
21	Papua New Guinea	Foundation for People and Community Development (FPCD)	Madang – 6 clan projects (sites scattered in the six districts)		Communities	Timber; NTFP production; fuelwood and/or charcoal production	1965	Yes (2007)
22	Viet Nam	Loc Bac State Operating Company	Lam Dong Province, Bao Lam District	34 851	Private company – state partnership	Timber; fisheries production (mud crabs, cockles, cage culture of sea bass); fuelwood and/or charcoal production; ecotourism/recreation	2005?	No
23	Viet Nam	Dak To Forestry Company	Dak To and Tu Mo Rong districts	42 090	State	Timber; NTFP production (rattan, bamboo); soil and water conservation; biodiversity conservation; local use	1986	No

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1	Forest utilization contracts on public land, 1977 (E F S)
2	Planning forest roads and harvesting systems, 1977 (E F S)
3	World list of forestry schools, 1977 (E/F/S)
3 Rev.1	World list of forestry schools, 1981 (E/F/S)
3 Rev.2	World list of forestry schools, 1986 (E/F/S)
4/1	World pulp and paper demand, supply and trade – Vol. 1, 1977 (E F S)
4/2	World pulp and paper demand, supply and trade – Vol. 2, 1977 (E F S)
5	The marketing of tropical wood in South America, 1976 (E S)
6	National parks planning, 1976 (E F S)
7	Forestry for local community development, 1978 (Ar E F S)
8	Establishment techniques for forest plantations, 1978 (Ar C E* F S)
9	Wood chips – production, handling, transport, 1976 (C E S)
10/1	Assessment of logging costs from forest inventories in the tropics – 1. Principles and methodology, 1978 (E F S)
10/2	Assessment of logging costs from forest inventories in the tropics – 2. Data collection and calculations, 1978 (E F S)
11	Savanna afforestation in Africa, 1977 (E F)
12	China: forestry support for agriculture, 1978 (E)
13	Forest products prices 1960-1977, 1979 (E/F/S)
14	Mountain forest roads and harvesting, 1979 (E)
14 Rev.1	Logging and transport in steep terrain, 1985 (E)
15	AGRIS forestry – world catalogue of information and documentation services, 1979 (E/F/S)
16	China: integrated wood processing industries, 1979 (E F S)
17	Economic analysis of forestry projects, 1979 (E F S)
17 Sup.1	Economic analysis of forestry projects: case studies, 1979 (E S)
17 Sup.2	Economic analysis of forestry projects: readings, 1980 (C E)
18	Forest products prices 1960-1978, 1980 (E/F/S)
19/1	Pulping and paper-making properties of fast-growing plantation wood species – Vol. 1, 1980 (E)
19/2	Pulping and paper-making properties of fast-growing plantation wood species – Vol. 2, 1980 (E)
20	Forest tree improvement, 1985 (C E F S)
20/2	A guide to forest seed handling, 1985 (E S)
21	Impact on soils of fast-growing species in lowland humid tropics, 1980 (E F S)
22/1	Forest volume estimation and yield prediction – Vol. 1. Volume estimation, 1980 (C E F S)
22/2	Forest volume estimation and yield prediction – Vol. 2. Yield prediction, 1980 (C E F S)
23	Forest products prices 1961-1980, 1981 (E/F/S)
24	Cable logging systems, 1981 (C E)
25	Public forestry administrations in Latin America, 1981 (E)
26	Forestry and rural development, 1981 (E F S)
27	Manual of forest inventory, 1981 (E F)
28	Small and medium sawmills in developing countries, 1981 (E S)
29	World forest products, demand and supply 1990 and 2000, 1982 (E F S)
30	Tropical forest resources, 1982 (E F S)
31	Appropriate technology in forestry, 1982 (E)
32	Classification and definitions of forest products, 1982 (Ar/E/F/S)
33	Logging of mountain forests, 1982 (E F S)
34	Fruit-bearing forest trees, 1982 (E F S)
35	Forestry in China, 1982 (C E)
36	Basic technology in forest operations, 1982 (E F S)
37	Conservation and development of tropical forest resources, 1982 (E F S)
38	Forest products prices 1962-1981, 1982 (E/F/S)
39	Frame saw manual, 1982 (E)
40	Circular saw manual, 1983 (E)
41	Simple technologies for charcoal making, 1983 (E F S)

42 Fuelwood supplies in the developing countries, 1983 (Ar E F S)
43 Forest revenue systems in developing countries, 1983 (E F S)
44/1 Food and fruit-bearing forest species – 1. Examples from eastern Africa, 1983 (E F S)
44/2 Food and fruit-bearing forest species – 2. Examples from southeastern Asia, 1984 (E F S)
44/3 Food and fruit-bearing forest species – 3. Examples from Latin America, 1986 (E S)
45 Establishing pulp and paper mills, 1983 (E)
46 Forest products prices 1963-1982, 1983 (E/F/S)
47 Technical forestry education – design and implementation, 1984 (E F S)
48 Land evaluation for forestry, 1984 (C E F S)
49 Wood extraction with oxen and agricultural tractors, 1986 (E F S)
50 Changes in shifting cultivation in Africa, 1984 (E F)
50/1 Changes in shifting cultivation in Africa – seven case-studies, 1985 (E)
51/1 Studies on the volume and yield of tropical forest stands – 1. Dry forest formations, 1989 (E F)
52/1 Cost estimating in sawmilling industries: guidelines, 1984 (E)
52/2 Field manual on cost estimation in sawmilling industries, 1985 (E)
53 Intensive multiple-use forest management in Kerala, 1984 (E F S)
54 Planificación del desarrollo forestal, 1984 (S)
55 Intensive multiple-use forest management in the tropics, 1985 (E F S)
56 Breeding poplars for disease resistance, 1985 (E)
57 Coconut wood – Processing and use, 1985 (E S)
58 Sawdoctoring manual, 1985 (E S)
59 The ecological effects of eucalyptus, 1985 (C E F S)
60 Monitoring and evaluation of participatory forestry projects, 1985 (E F S)
61 Forest products prices 1965-1984, 1985 (E/F/S)
62 World list of institutions engaged in forestry and forest products research, 1985 (E/F/S)
63 Industrial charcoal making, 1985 (E)
64 Tree growing by rural people, 1985 (Ar E F S)
65 Forest legislation in selected African countries, 1986 (E F)
66 Forestry extension organization, 1986 (C E S)
67 Some medicinal forest plants of Africa and Latin America, 1986 (E)
68 Appropriate forest industries, 1986 (E)
69 Management of forest industries, 1986 (E)
70 Wildland fire management terminology, 1986 (E/F/S)
71 World compendium of forestry and forest products research institutions, 1986 (E/F/S)
72 Wood gas as engine fuel, 1986 (E S)
73 Forest products: world outlook projections 1985-2000, 1986 (E/F/S)
74 Guidelines for forestry information processing, 1986 (E)
75 Monitoring and evaluation of social forestry in India – an operational guide, 1986 (E)
76 Wood preservation manual, 1986 (E)
77 Databook on endangered tree and shrub species and provenances, 1986 (E)
78 Appropriate wood harvesting in plantation forests, 1987 (E)
79 Small-scale forest-based processing enterprises, 1987 (E F S)
80 Forestry extension methods, 1987 (E)
81 Guidelines for forest policy formulation, 1987 (C E)
82 Forest products prices 1967-1986, 1988 (E/F/S)
83 Trade in forest products: a study of the barriers faced by the developing countries, 1988 (E)
84 Forest products: World outlook projections – Product and country tables 1987-2000, 1988 (E/F/S)
85 Forestry extension curricula, 1988 (E/F/S)
86 Forestry policies in Europe, 1988 (E)
87 Small-scale harvesting operations of wood and non-wood forest products involving rural people, 1988 (E F S)

88 Management of tropical moist forests in Africa, 1989 (E F P)
89 Review of forest management systems of tropical Asia, 1989 (E)
90 Forestry and food security, 1989 (Ar E S)
91 Design manual on basic wood harvesting technology, 1989 (E F S) (Published only as FAO Training Series, No. 18)
92 Forestry policies in Europe – An analysis, 1989 (E)
93 Energy conservation in the mechanical forest industries, 1990 (E S)
94 Manual on sawmill operational maintenance,1990 (E)
95 Forest products prices 1969-1988, 1990 (E/F/S)
96 Planning and managing forestry research: guidelines for managers, 1990 (E)
97 Non-wood forest products: the way ahead, 1991 (E S)
98 Timber plantations in the humid tropics of Africa, 1993 (E F)
99 Cost control in forest harvesting and road construction, 1992 (E)
100 Introduction to ergonomics in forestry in developing countries, 1992 (E F I)
101 Management and conservation of closed forests in tropical America, 1993 (E F P S)
102 Research management in forestry, 1992 (E F S)
103 Mixed and pure forest plantations in the tropics and subtropics, 1992 (E F S)
104 Forest products prices 1971-1990, 1992 (E/F/S)
105 Compendium of pulp and paper training and research institutions, 1992 (E)
106 Economic assessment of forestry project impacts, 1992 (E/F)
107 Conservation of genetic resources in tropical forest management – Principles and concepts, 1993 (E/F/S)
108 A decade of wood energy activities within the Nairobi Programme of Action, 1993 (E)
109 Directory of forestry research organizations, 1993 (E)
110 Proceedings of the Meeting of Experts on Forestry Research, 1993 (E/F/S)
111 Forestry policies in the Near East region – Analysis and synthesis, 1993 (E)
112 Forest resources assessment 1990 – Tropical countries, 1993 (E)
113 Ex situ storage of seeds, pollen and in vitro cultures of perennial woody plant species, 1993 (E)
114 Assessing forestry project impacts: issues and strategies, 1993 (E F S)
115 Forestry policies of selected countries in Asia and the Pacific, 1993 (E)
116 Les panneaux à base de bois, 1993 (F)
117 Mangrove forest management guidelines, 1994 (E)
118 Biotechnology in forest tree improvement, 1994 (E)
119 Number not assigned
120 Decline and dieback of trees and forests – A global overview, 1994 (E)
121 Ecology and rural education – Manual for rural teachers, 1995 (E S)
122 Readings in sustainable forest management, 1994 (E F S)
123 Forestry education – New trends and prospects, 1994 (E F S)
124 Forest resources assessment 1990 – Global synthesis, 1995 (E F S)
125 Forest products prices 1973-1992, 1995 (E F S)
126 Climate change, forests and forest management – An overview, 1995 (E F S)
127 Valuing forests: context, issues and guidelines, 1995 (E F S)
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FAO FORESTRY PAPER

Multiple-use forest management in the humid tropics

Opportunities and challenges for sustainable forest management

The multiple-value nature of forests has long been appreciated and used by forest-dependent people in the tropics. Explicitly managing for some or all of these values – multiple-use forest management – is stipulated in the laws of many countries, but its formal implementation in the tropics is thought to be rare.

This paper reports on three regional assessments carried out to identify and draw lessons from on-the-ground initiatives in multiple-use forest management in the Amazon Basin, the Congo Basin and Southeast Asia. In all three regions, information was collected through interviews with country-based forestry experts, forest managers and technicians. A complementary, Web-based questionnaire further examined the reasons for the successes and failures of multiple-use forest management initiatives.

The paper concludes that forest managers need more support if they are to realize the potential of multiple-use forest management. Greater effort is needed to eliminate unfair competition from operators whose sole objective is to extract timber, with little or no concern for multiple uses. In most countries, the demarcation of a permanent forest estate and the development of national land-use plans would increase investment in multiple-use forest management. Improving the value of logged-over forest through silviculture would also increase the uptake of multiple-use approaches.

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