Participants Reports on Forest Resources Management

Proceedings of APFNet Workshop on Forest Resources Management

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APFNet

Preface

As part of its capacity building program, the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) sponsored its fourth workshop under the theme "forest resources management" which took place in Kunming City in November 2010. Senior officials from 13 member countries exchanged views on the topic and learned from each other about the successes and ongoing issues in the region.

Participants reported on forest management activities in his/her country, highlighting areas of particular interest: the rehabilitation of mangrove forests in Bangladesh, elephant logging in Myanmar, community forestry in Nepal and forest restoration in the Philippines, among others. They also identified the main challenges which the sector is facing, along with the strategies that are in place to overcome them. These presentations were extremely useful and served as the basis for many rich exchanges and discussions, for example, on the need for comprehensive legal systems, strong governance and sound forest policies. Participants concluded that, because these aspects are often weak, progress towards sustainable forest management can be slow. They also noted that the problems which result, in many instances, lead to severe forest degradation, deforestation, illegal activities and associated trade.

In the interest of sharing the valuable insights which participants provided, APFNet is pleased to make this compilation of country reports available. Two presentations by lecturers from Australia and China have also been included. The documents not only identify the challenges that Asia-Pacific countries still face with regard to achieving sustainable forest management, but they also include key factors which determined the success of implementation and the effectiveness of outcomes.

We hope that readers will find the information helpful in terms of efforts they are currently undertaking to improve the situation in their country and region. Last but not least, we would like to thank all workshop participants for their important contributions. Their willingness to recount experiences and lessons learned made this publication possible.

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Content

Sustainable Forest Management in Australia

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1. Australia's Forests

The native forests of Australia are very different from that of countries in the northern hemisphere. The open forests dominated by eucalypt species are unique to this country. There are about 700 native eucalypt species that are native only to Australia. Some of the fast growing eucalypt species have been introduced to many countries, where they have become a mainstay of the forest economy serving domestic markets and generating income from exports.

According to the latest forest statistics from the Australian Bureau of Agricultural and Resource Economics (ABARE 2009), Australia has a total forested area of more than 149 million hectares, or around 19.42% of the country's total land area. The total forested area is made up of mostly native forest, along with approximately 2.02 million hectares of plantations. With a relatively small population of 21.4 million, there are about 7 hectares of forest for each person in Australia, much higher than the world average of less than 0.6 ha of forest per person.

In addition to their uniqueness, Australia's forests are also diverse, ranging from tropical forests in the wet tropics in north-eastern Queensland to mallee eucalypts and mulga scrub (i.e. Acacia aueura woodland) in arid areas. To encompass the extreme diversity in forest types, a forested area has been defined in the National Forest Inventory as an area incorporating all living and non-living components that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 meters and with existing or potential crown cover of overstorey strata about equal to or greater than 20%. This definition includes Australia's diverse native forests and plantations, regardless of age. It is also sufficiently broad to encompass areas of trees that are described as woodlands.

The native forest types in Australia are dominated by eucalypts (78%) followed by acacias (7%) and melaleucas (5%). The 2.02 million ha of planted forests are comprised of 1.02 million ha of softwood plantations, and 0.99 million ha of hardwood plantations, with the rest being represented by small scale mixed plantings on farms. The major softwood plantation species is Pinus radiata, native to a very restricted natural range along the central coast of California, United States and the Cedros and Guadalupe islands off Baja California in Mexico (Rogers et al. 2006). The hardwood plantation species are dominated by eucalypts and vary with climatic and site conditions of the growing regions.

Because of its hot and dry climate, fire has been an integral part of the Australian environment and naturally occurring wildfires have been a long-established feature of the Australian landscape (Jurskis 2005, Lynch et al. 2007). Fire has had a significant impact on the composition and structure of Australian forests and many eucalypt species have adaptive traits ensuring their survival – even after very intense fires (Florence 1996). Due to the ecological and economic importance of bushfires, fire management has become a significant component of ecologically sustainable forest management in Australia.

2. Sustainable Forest Management in Australia

Australia has a three-tiered system of government consisting of Commonwealth (or Federal), State (Territory) and Local governments. Each level of government has different responsibilities and powers. The management of forest resources on public lands is primarily

the responsibility of State and Territory governments, while the Australian Commonwealth Government coordinates a national approach to environmental and industry development issues. The Australian government is also responsible for meeting Australia's international obligations through a number of conventions and treaties.

2.1 National Forest Policy Statement

At the United Nations Conference on the Environment and Development in Rio de Janiero in 1992, Australia endorsed the Global Statement of Principles on Forests and signed a number of conventions relating to Biological Diversity and Climate Change. In order to achieve the full range of benefits that forests can provide, the Commonwealth and State governments worked together to develop a National Forest Policy Statement for sustainable forest management in Australia. This statement was developed in 1992 after a long period of public and intergovernmental debate about how Australia's forests should be managed. Based on a shared vision of ecologically sustainable management of Australia's forests, the statement sets out eleven broad national goals to be pursued and also provides a comprehensive set of values for sustainable forest management.

The shared vision has the following characteristics:

- The unique character of the Australian forested landscape and the integrity and biological diversity of its associated environment is retained.
- The total area of forest is increased.
- There is a 'holistic' approach to managing forests for all their values and uses so as to optimise benefits to the community.
- Private forests are managed in an ecologically sustainable manner and in close cooperation with public forest managers, to complement the conservation and commercial objectives of public forests.
- A range of sustainable forest based industries, founded on excellence and innovation, will be expanding to contribute further to regional and national economic and employment growth.
- Forests and their resources are used in an efficient, environmentally sensitive and sustainable manner.
- Forest management is effective and responsive to the community.
- The Australian community will have a sound understanding of the values of forests and
- Sustainable forest management, and will participate in decision-making processes relating to forest use and management.

To achieve this vision, the following eleven broad national goals are to be pursued:

- **Conservation**

The goals are to maintain an extensive and permanent native forest estate in Australia and to manage that estate in an ecologically sustainable manner so as to conserve the full suite of values that forests can provide for current and future generations. These values include

biological diversity, and heritage, Aboriginal and other cultural values.

• Wood production and industry development.

The goal is for Australia to develop internationally competitive and ecologically sustainable wood production and wood products industries. Efficient industries based on maximizing value-adding opportunities and efficient use of wood resources will provide the basis for expansion in wood products manufacturing, which in turn will provide national and regional economic benefits.

• Integrated and coordinated decision making and management.

The goals are to reduce fragmentation and duplication in the land use decision-making process between the States and the Commonwealth and to improve interaction between forest management agencies in order to achieve agreed and durable land use decisions.

• Private native forests.

The goal is to ensure that private native forests are maintained and managed in an ecologically sustainable manner, as part of the permanent native forest estate, as a resource in their own right, and to complement the commercial and nature conservation values of public native forests.

• Plantations

One goal is to expand Australia's commercial plantations of softwoods and hardwoods so as to provide an additional, economically viable, reliable and high-quality wood resource for industry. Other goals are to increase plantings to rehabilitate cleared agricultural land, to improve water quality, and to meet other environmental, economic or aesthetic objectives.

• Water supply and catchment management.

The goals are to ensure the availability of reliable, high-quality water supplies from forested land and to protect catchment values.

• Tourism and other economic and social opportunities.

The goal is to manage Australia's forests in an ecologically sustainable manner for a range of uses, including tourism, recreation and production of nonwood products.

• Employment, workforce education and training.

The goal is to expand employment opportunities and the skills base of people working in forest management and forest based industries.

• Public awareness, education and involvement.

The goals are to foster community understanding of and support for ecologically sustainable forest management in Australia and to provide opportunities for effective public participation in decision making.

• Research and development.

The goals are to increase Australia's national forest research and development effort and to ensure that it is well coordinated, efficiently undertaken and effectively applied. This research will expand and integrate knowledge about the many aspects of native forests, plantations, forest management, conservation, and forest product development.

- **International responsibilities.**

The goals are to promote nature conservation and sustainable use of forests outside Australia and to ensure that Australia fulfils its obligations under relevant international agreements.

2.2 Regional Forests Agreements (RFAs) for native forests

Regional Forests Agreements (RFAs) were a key element of the National Forest Policy Statement. RFAs are 20-year plans for the conservation and sustainable management of Australia's native forests. The foundation of the agreements was a series of Comprehensive Regional Assessments (CRAs) of the social, economic, environmental and cultural and natural heritage values of the regions' native forests. The CRAs provided the scientific basis on which the State and Commonwealth governments signed RFAs for the forests. The RFA process involved widespread consultation to obtain the views of as many people as possible with an interest or stake in Australia's forests. An important result of the negotiations was a world-class Comprehensive Adequate and Representative (CAR) reserve system protecting the environmental and heritage values of forests through national parks and other reserves. In addition, the RFAs provided for complementary ecologically sustainable forest management outside reserves. The RFAs also intended to provide secure access to forest resources, making possible continued development of internationally competitive and ecologically sustainable industries.

The RFA process and its outcomes significantly affected the way forests are managed in Australia by substantially increasing the area of forests and woodlands in the reserve system and the level of protection for forest values in multiple use forests where sustainable timber harvesting is permitted. At present there are 10 RFAs for public forests in four States: Western Australia, Victoria, Tasmania and New South Wales. The Agreements provide a certain degree of certainty for forest-based industries, forest-dependent communities and conservation in these regions.

A particular example is the Eden RFA that the Commonwealth and New South Wales governments signed in August 1999 for the native forests in southeast New South Wales.

A joint Commonwealth/State Steering Committee was set up to oversee the comprehensive regional assessment of forests in New South Wales. An Ecologically Sustainable Forest Management Group (ESFM Group) was formed to co-ordinate enquiry as one of the four streams preparing information for the CRA/RFA process in NSW. Following a lengthy and some times wasteful process, the EDEN RFA was signed and it covered the following aspects:

- Monitoring, Reporting and Consultative Mechanisms;
- Accredition;
- Sustainability Indicators;

- Private Land;
- Threatened flora and fauna;
- The CAR reserve system;
- Industry and Regional Development;
- Indigenous Heritage;
- Plantations;
- Other forest uses ;
- Competition principles;
- Research and Data Agreement.

The Eden RFA established a CAR reserve system covering about one third of the region and more than half of the region's public land. More than 255 000 hectares of the region is in dedicated reserves, with another 12 000 hectares in informal and other reserves. The resource security provided by the RFA helped the region's $65 million native hardwood industry to attract new investment in value-adding facilities, explore new markets and create new jobs.

3. Plantations for Australia – the 2020 Vision

The 2020 Vision was launched in 1997 with the goal to enhance regional wealth creation and international competitiveness through a sustainable increase in Australia's plantation resources, based on a notional target of trebling the area of commercial tree crops by 2020. This strategy has resulted in a doubling of Australia's plantation estate over the past 13 years. However, state governments have largely withdrawn from establishing new plantations, and they are only focusing on re-planting harvested areas. Managed Investment Schemes (MIS) based on taxation arrangements for plantation developments funded most of the new investment. Following the financial crisis all major MIS companies have collapsed. The following excerpt from an a newspaper article by Andrew Main (The Australia, 18 September 2010) showed the scale of the problem

"PICTURE an Australian timber plantation 68km by 68km, and think of the sweat and money that's gone into creating it over the past 20 years.

It's all for sale, or has been sold, by administrators and liquidators in the past year, even though it's never been burnt out, or had significant numbers of trees die because of drought.

This is because the plantations were all in rural managed investment schemes (MIS), an investment model that has been comprehensively demolished by the fact that all the biggest players in the business have collapsed since April last year, taking about $4.2 billion of investors' monies with them.

The trees are all still there, mostly blue gums, accidentally doing their bit for carbon capture, but essentially put there to be harvested when mature, reduced to woodchips and shipped

offshore for paper manufacture.

They went broke because they weren't actually self-sustaining. Once upfront fees of 10 per cent were paid to investment advisers, promoters overpaid for leases and the various other costs were taken out, even after the trees were harvested there was less money being earnt than spent.

The 68km by 68km area represents the 463,000 hectares that were managed by the biggest four companies, now defunct, operating in the MIS space."

4. Fire – the burning issue

Management of fire in forests and woodlands is principally governed by legislation passed by State and Territory governments. There has been an ongoing debate about fire management of Australia's forests. Prescribed burning is the planned application of fire under specified environmental conditions to meet particular management objectives. It is an important tool for forest management and is used for a range of purposes including forest regeneration, site preparation, fuel reduction and habitat management (IFA 2006). However, there is a widespread perception among the general public that prescribed burning has a negative impact on the environment, biodiversity and forest ecosystems (Jurskis et al. 2003). Some legislation even listed frequent fire as a threatening process to threatened species. The debate is unabating even after the most recent tragic bushfires in 2003 and 2009 that led to the loss of many lives, properties and community assets in Canberra and Victoria. The debate is pulling Australian forest fire management in opposing directions, making it difficult to develop a national forest fire management policy. The recent tragic bushfires will hopefully lead to stronger advocacy of more active forest fire management in Australia.

5. Future Directions for Australia's National Forest Policy

The National Forest Policy Statement provided the basis for development of the Regional Forest Agreements, the Plantations 2020 initiative, and the implementation, reporting and certification of sustainable forest management in Australia (IFA 2009). Since its inception in 1992, a range of national and international issues has gained increasing prominence in community and policy debate on forest management. A revision is needed to take into account of these issues. From the perspective of the Institute of Foresters of Australia (IFA 2009), the most pressing issues to be considered in a revision of The National Forest Policy Statement include

- Promoting Active management to sustain the values of all native forests;
- Enhancing the role of forests in delivering ecosystem services;
- Developing the role of forests as part of climate mitigation responses;
- Supporting the role of plantations in delivering multiple benefits;
- Strengthening the implementation of the National Indigenous Forestry Strategy;

- Developing enhanced regulatory and reporting systems to support sustainable forest management;
- Foster innovation in forest management and the use of forest products;
- Improving Australia's capacity to manage for production and sustainability of forest values through research, education and training that takes into account the major long-term challenges to forest management.

However, forestry issues are highly political in Australia. The nature and the levels of participation by different stakeholders, community and environmental groups, and the general public in the development process of forestry policies can not always guarantee a sensible and scientifically sound policy outcome.

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Mangrove Forest Rehabilitation in Bangladesh

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1. Background

Bangladesh lies in the northeastern part of South Asia between 20^0 34' and 26^0 38' North latitude and 88^0 01' and 92^0 41' East longitude. India surrounds the country on the west, the north, and the northeast. Myanmar lies to the southeast and the Bay of Bengal is south. The coastal zone covers about 46,873 sq km or 32 percent of the country's total area (147,570 sq. km) and includes offshore islands, mudflats, chars and new accretions. Of the country's 151.41 million people, 35.10 million live on the coast and depend on agriculture, fisheries and salt production for their livelihood. Due to the geomorphology, this zone is particularly susceptible to tropical storms and tidal surges which occur frequently in the Bay of Bengal. In this region, mangrove forests act as critically important shelter belts.

The country's climate is sub-tropical monsoon, with pleasant winters (November to February). Temperature ranges from a low of 7^0C to a high of 31.11^0 C but occasionally exceeds 40.50^0C in some areas. The monsoon season runs from July to October when Bangladesh receives 80% of its total annual rainfall which varies between 1430mm and 4360 mm.

Forest land comprises 2.52 million ha (Table 1) or 17.07 percent of the total area of the country. The Forest Department manages 1.52 million hectares (Table 2), of which nearly 50% are natural and planted mangroves. There are 5 forest types: tropical wet evergreen, tropical semi-evergreen, tropical moist deciduous, tropical mangrove and fresh water forests.

Table 1: Forest Land of Bangladesh

Forest types	Area (m. ha)	% of total area
FD Managed Forest	1.52	10.300
Unclassified State Forest (USF)	0.73	4.947
Homestead Forest	0.27	1.830
Total	2.52	17.077

Table 2: Forest Land Managed by the Forest Department

Forest types	Area (m. ha)	% of total area
Hill Forest	0.67	4.540
Natural Mangrove Forest	0.60	4.066
Mangrove Plantation	0.13	0.881
Sal Forest	0.12	0.813
Total	1.52	10.300

2. Mangrove forests

Mangroves are salt-tolerant forest ecosystem which are inundated twice a day in high tide. Bangladesh's coast is about 710 km long, extending along the Bay of Bengal from the mouth of the Teknaf river in the southeast to the mouth of the Raimangal river in the west. These areas are under the greater district of Chittagong, Noakhali, Barisal, Patuakhali and Khulna and include estuaries and inlands near the mainland. The natural mangrove forests include the Sundarbans, the Chakoria Sundarbans and the fringe of the eastern coast. In fact, Bangladesh is a pioneer with regard to the management of natural and planted mangrove forests.

2.1 The Sundarbans

2.1.1 Introduction: The Sundarbans Reserved Forest is located in a unique bioclimatic zone in the Bay of Bengal and is the single largest contiguous block of natural mangrove forest in the world. It is situated in the extreme south-west corner of Bangladesh and lies between latitude 21^0 27' 30" and 22^0 30' North and longitude 89^0 02' & 90^0 East. The tract, including the 40% found in the 24-Pargana district in India, covers 10,000 km^2. Some 66% is on land, with the remainder under water. About 6,017 km^2 or 601,700 ha (60%) are in Bangladesh. The Sundarbans covers 4.07% of the country's land mass but makes up 40% of total forest land. In the eighteenth century, the forest was about double the present size. Large scale deforestation drew the attention of the British government which took control of its management in 1869 and declared it a reserved forest in 1878 under the Forest Department. About 3.5 million people depend on the resources of the Sundarbans for their livelihood.

2.1.2 Administration: The Sundarbans is under Khulna Forest Circle and, in 2001, it was divided into Sudarban West Forest Division and Sundarban East Forest Division. A total of 1068 staff are employed in 4 ranges, 17 revenue stations and 72 patrol posts/camps.

2.1.3 Flora: The composition of flora is rich compared to many other mangroves in the world. The Sundarbans supports about 25 true mangrove species while others are associates or non-obligatory. Prain (1903) recorded 334 species of plants - belonging to 245 genera and 75 families - all of which are indigenous to the Sundarbans. None, so far, are considered rare. Some 165 algae and 13 orchid species are also recorded. Table 3 lists the economically important plants and their main uses:

Table 3: Important plants of Sundarbans and their uses

Vernacular Name	Scientific Name	Family	Plant Type	Main Uses
Sundri	Heritiera fomes	Sterculiaceae	Tree	housing and boat construction, electric poles, hardboard
Keora	Sonneratia apetala	Sonneratiaceae	Tree	boxes, construction material
Baen	Avicennia officinalis	Avicinniaceae	Tree	fuelwood, anchor log
Passur	Xylocarpus mekongensis	Malvaceae	Tree	furniture, bridges, housing
Kakra	Bruguiera sexangulata	Rhizophoraceae	Tree	furniture, bridges, housing
Goran	Ceriops decandra	Rhizophoraceae	Shrub	fuelwood, house posts, charcoal
Golpata	Nypa fruticans	Palmae	Recumbent palm	thatching
Shingra	Cynometraramiflora	Liguminosae	Shrub	fuelwood
Hantal	Phoenix paludosa	Palmae	Thorny palm	posts, rafters for huts
Gewa	Excoecaria agalocha	Euphorbiaceae	Tree	matches and boxes, newsprint, paper
Kripa	Lumnitzera racemosa	Combretaceae	Small Tree	fuelwood, posts
Dhundul	Xylocarpus granatum	Malvaceae	Tree	furniture, pencils

2.1.4 Fauna: The Sundarbans harbors more than 400 wildlife species: 35 reptiles, 315 birds, 8 amphibians and 42 mammals, including the magnificent Royal Bengal Tiger. Table 4 lists the major ones, along with a few of their numbers.

Table 4: Major wildlife in the Sundarbans

English Name	Scientific Name	Class	Status/ Numbers
Royal Bengal Tiger	Panthera tigris	Mammalia	Critically endangered (400-440)
Deer	Axix axix	Mammalia	Abundant (100,000-150,000)
Wild boar	Susscofa	Mammalia	Abundant (20,000-25,000)
Monkey	Macaca mulata	Mammalia	Abundant (40,000-50,000)
Dolphin	Platanista gangetica	Mammalia	Endangered (under study)
Otter	Aonyx cinerea	Mammalia	Endangered (20,000-25,000)
Jungle cat	Felis chaus	Mammalia	Endangered
Fishing cat	Felis viverrina	Mammalia	Endangered
Estuarine Crocodile	Crocodylus porosus	Reptilia	Critically endangered (150-200)
Cobra	Naja naja	Reptilia	Critically endangered
Asiatic soft-shell turtle	Chitra indica	Reptilia	Critically endangered
Spotted flap-shell turtle	Lissemys punctata	Reptila	Vulnerable
Green frog	Euphlyctis hexadactylus	Amphibia	Endangered
Swamp partridge	Francolinus gularis	Aves	Critically endangered
Red jungle fowl	Gallus gallus	Aves	Rare
White backed vulture	Gyps bengalensis	Aves	Rare

2.1.5 Fish: More than 400 fish species have been recorded in the Sundarbans: 53 species of pelagic fish belonging to 27 families; 24 species of demersal fish belonging to 49 families; 24 species of shrimps belonging to 5 families; 7 species of crabs belonging to 3 families; 2 species of gastropods; 6 species of pelecypods; 8 species of locust lobster; and 3 species of turtles (Acharya and Kamal, 1994). With regard to aquaculture and the shrimp industry, 3 districts adjoining the Sundarbans - Khulna, Satkhira and Bagerhat - account for about 80% of the total activity. The important fish species are Hilsa tenualosa, Mystus gulio, Lates calcarifer, Pomodasys hasta, Selar spp, Harpadon nehereus, Pangasius pangasius, Johnius dussumeri, J argentatus, Polynemus spp, Marcobrachium rosenbergii, Plotosus canius, Trichiurus haumela, Setipinna taty, Mugil cephalus, Liza parsia, Pampus argenteus, Sadinala spp, and Penaeus monodon. Moreover, the Sundarbans is the feeding ground for many species until they reach adulthood and leave for the open sea.

2.1.6 Management: The Sundarbans is managed under a system of selection-cum-improvement felling over a 20-year cycle. The plan divides the forest into working circles of Gewa (E agallocha), Sundri (H fomes), and Keora (S apetala), in addition to prescribing treatment for other tree and shrub species. The minimum diameter for the exploitation

of different species for 3 site quality classes were fixed and yield was regulated by area. However, a moratorium on felling was introduced in 1989 and is still in force.

With financial assistance from the Asian Development Bank under the Sundarbans Biodiversity Conservation Project, the Forest Department has implemented assisted natural regeneration (5,000 hectares) and carried out enrichment planting (10,000 hectares) . These programs can generally be viewed as unsuccessful, mainly due to inadequate knowledge about ecological processes in the mangrove habitat. Other initiatives of the Forest Department include the establishment of 2,500 hectares of Nipa plantations and 650 kilometers of strip plantations. It has also distributed 1.40 million seedlings for homestead plantations to improve livelihoods in the zone surrounding the Sundarbans.

2.1.7 Conservation: World Heritage Site: As a part of conservation efforts, 3 wildlife sanctuaries were established in natural areas deemed to have good management potential. They represent the 3 biotypes, cover 1397 sq km (23% of the forest), are free from timber extraction and other forms of harvesting, and are maintained as undisturbed breeding grounds. In December 1997, UNESCO recognized the Sundarbans of Bangladesh (some parts of these sanctuaries) as the 798th World Heritage Site.

Ramsar Site: The Sundarbans is the world's largest delta and largest estuarine wetland. The wetland is a globally significant ecosystem which is rich in biodiversity and, in 1992, it was declared the 560th Ramsar Site.

2.2 The Chakoria Sundarbans

2.2.1 Introduction: The Chakoria Sundarbans is located in eastern Bangladesh and occupies the central part of the Matamuhury delta in the district of Cox'sbazar. It is one of the oldest natural mangrove forests on the Indian sub-continent (Choudhury, 1967). Although it resembles the Sundarbans proper in many ways, including in terms of floral composition, the reason the names are similar is unknown. Vegetation of the Chakoria Sundarbans initially consisted of 53 species belonging to 42 genera and 22 families (Cowan, 1926) and the area extended over about 8,540 hectare when it was declared a reserved forest in 1903. Prior to that time, forests covered about 18,200 ha (Cowan, 1926). Now, however, they are severely depleted due to shrimp farming which expanded rapidly all along the coast of Bangladesh in recent years.

2.2.2 Present condition: All the trees inside the shrimp ponds were cut and those outside these areas were illicitly harvested. Only a few scared trees remain so that the entire Chakoria Sundarbans is now an open area. Stumps are found throughout the forest and cuts indicate that it was under moderate cover only 3 or 4 decades ago. Now, only 100 healthy trees may survive. When the first conversion of the forest for shrimp cultivation was proposed, it was claimed that the area was too saline to grow mangroves. However, in reality, the salinity level drops below the optimal level for shrimp production during the monsoon season.

The destruction of Chakoria Sundarbans is a shocking example of the consequences of ill-informed government policies and pressure by the surrounding unenlightened population (Siddiqi et al, 1994). Other factors which contributed to the depletion of the Chakoria Sundarbans include over exploitation, unsustainable removal of minor forest products and fuel wood, grazing, human settlement and uncontrolled fishing.

2.2.3 Aquaculture at Chakoria Sudarbans: Mangroves act as nurseries for aquatic animals. Because estuarine areas have turbid waters, light penetration is reduced - a factor which lowers productivity. In contrast, shallow waters in the mangrove system support abundant life. Many commercially important fish species, including shrimp, congregate in these areas for shelter and to feed on particular organic matter. Destruction of this habitat, therefore, decreases the nutrients on which fish, crustaceans and mollusks rely.

2.2.4 Conclusion: Wood production from a mangrove forest is low and income is much lower compared with shrimp cultivation. However, mangroves not only harbor rich biodiversity which must be conserved, they also minimize the loss of life and property due to cyclones and tidal surges. The disastrous event of 1991 that claimed 20,000 lives from this area should be a lesson for all.

2.3 Coastal Plantations

2.3.1 Introduction: In addition to managing natural forests, the foresters of Bangladesh have been engaged in extensive mangrove afforestation along the 710 km coastline of the Bay of Bengal over the past 50 years. The Forest Department has about 170,000 ha of mangrove plantations, mostly along the central coast. However, efforts over sizable areas have not been successful for a number of reasons.

2.3.2 History of coastal plantations: As noted above, loss of human life and property is common in the coastal areas due to cyclone and tidal surges. In 1966, the protective role of natural mangroves led the Forest Department to initiate the establishment of mangrove plantations in the inter-tidal zone outside the protective coastal embankment. Nowhere outside Bangladesh have mangroves been planted on such a large scale. In fact, it was rather a new forestry practice at the time.

2.3.3 Objectives of coastal plantations: The early success of the plantation program resulted in setting other objectives, in addition to protection from cyclones and tidal surges:

- protection of life and property of the coastal population against cyclone and tidal surges
- conservation and stabilization of newly accreted lands and acceleration of further accretion with the ultimate aim of transferring a large part of this land to agriculture
- production of timber for fuel wood and industrial use
- injection of urgently needed resources (timber and new land) into the national economy
- creation of employment opportunities for remote rural communities
- development of suitable environment for wildlife, fish and other estuarine and marine fauna.

2.3.4 Mangrove plantation programs: Over the last five decades, the Forest Department has successfully implemented several massive projects:

1. Afforestation in the coastal belt and offshore islands (1960–61 to 1964–65)
2. Afforestation in the coastal belt and offshore islands (1965–66 to 1969–70)
3. Afforestation in the coastal regions of Chittagong, Noakhali, Barishal and Patuakhali (1974–

75 to 1979–80)

4. Mangrove Afforestation Project (1980–81 to 1984–85)
5. Second Forestry Project (1985–86 to 1991–92)
6. Forest Resources Management Project (1992–93 to 2001–2002)
7. Extended Forest Resources Management Project (2002–03 to 2003–04)
8. Coastal Green Belt Project (1995–96 to 2001–02)
9. Coastal Char Land Afforestation Project (2005–06 to 2009–10)
10. Management Support Project for Sundarbans Reserve Forest (2005–06 to 2009–10).

Under the Coastal Green Belt Project, with people's participation, the Forest Department planted trees along 8,934 kilometers of rail, road and embankments as well as 635 hectares on offshore islands. The Coastal Char Land Afforestation Project, at a cost of Tk.180 million, involved the establishment 11,150 ha of mangrove plantations with keora (Sonneratia apetala) and baen (Avicennia officinalis, Avicennia alba, Avicennia marina) and the rehabilitation of 2,500 ha of old plantations with non-mangrove species, again with public participation.

2.3.5 Planting sites: Proper site selection is vital for the successful establishment of plantations. However, because geomorphologic changes in the coastal areas are rapid and unpredictable, and because winds cause soils to shift, it is difficult to determine the best locations. Four types of change adversely affect mangrove afforestation in Bangladesh: rapid accretion, sand smothering, sediment winnowing and erosion. As a result of such instability, the risk of loss until trees mature is high. Therefore, it is very important that experienced field staff carry out this work.

2.3.6 Species selection: Both Sonneratia apetala and Avicenia officinalis are the pioneer species in the ecological succession of natural mangroves in Bangladesh. Reasons for their better performance in afforestation over other species include the fact that they grow well in new and regularly inundated accretion areas, require a significant amount of light, and rapidly develop an aerial root system. Lack of suitable alternatives has resulted in monocultures of either S apetala or A officinalis.

2.3.7 Sustainable management of plantations: Some knowledge of coastal oceanography and hydrology is useful for the efficient management of the coastal forest ecosystem, especially mangrove plantations in the inter-tidal areas. To a great extent, hydrological factors determine species selection, site suitability, planting techniques and, finally, the success of afforestation efforts. For example, although the depth and duration of tidal inundations are influenced by the position of the moon, they vary considerably in spring and at neap tides. Because these tides allow more time to complete the work, it is during this phase that plantations are established.

Many planted mangroves are in good condition and those developed early are approaching maturity. However, in places, they are subject to degradation and encroachment so that a second generation should be established to act as shelter belts along the coast. Government understands the urgent need to rehabilitate these natural and planted mangroves and to establish additional sites. Therefore, it is taking steps accordingly.

3. Issues

3.1 The Sundarbans

3.1.1 Top dying of Heririera fomes: Heririera fomes is the climax species of the Sundarbans and constitutes about 65% of the standing volume of merchantable timber. Almost 17% of stems are affected by top dying - a disease or disorder which kills leaves and branches from the top down. Researchers have yet to determine the causes but the most probable include an increase in soil salinity, insect attack, gall canker, sediment deposition, change in level of inundation, and cyclone damage.

3.1.2 Silt deposits: While not a key factor in the western part where the forest floor is compact and does not support vigorous tree growth, silt deposits in the northeastern part of the forest threaten the existence and regeneration of mangrove vegetation because they raise the floor and cause tides to flow irregularly.

3.1.3 Increased salinity: The commercially important species of the Sundarbans require different levels of salinity for survival, distribution, reproduction and optimal growth. Since the early 1970s, the flow of fresh water in Indian Bengal has been diverted upstream, where a dam was built at Farakka to impound the water of the Ganges. This change increased the water salinity and, as a result, the forest no longer supports heavy stands of H fomes. Natural regeneration is also unsatisfactory.

3.1.4 Natural regeneration: Research shows that, every year, seedlings of different species are plentiful on the forest floor. It also reveals that recruitment density varies considerably and that most seedlings soon disappear. After 33 months, their survival rate does not exceed 5%.

3.1.5 Over exploitation: Forest resources have been overexploited, possibly due to faulty estimates of volume increment and the illegal removal of forest products. A temporary moratorium on timber harvesting has been imposed in light of the fact that the standing volume of dominant tree species has drastically declined. However, extraction of fuel-wood and non-timber forest products continues.

3.2 The Chakoria Sunbarbans

3.2.1 Damage by shrimp farming: Although shrimp farming is a highly profitable business, the preparation and subsequent management of ponds have caused soils to deteriorate. Many areas have been abandoned because they have become unsuitable not only for shrimp farms but also for forestry, fisheries and agriculture.

3.3 Coastal Plantation

3.3.1 Encroachment: Erosion in the coastal areas has made many people homeless and without a means to earn a living. The crisis these people face forces them to ignore the importance of maintaining the protective function of mangrove plantations against natural calamities. Thus in many areas, victims of erosion are unlawfully occupying the raised forestlands.

3.3.2 Grazing: Remote coastal areas support buffaloes, cows, goats and sheep and their products can be found in the distant markets of the country. Grazing cattle on new land along the coastline is a traditional practice in Bangladesh but such activity is highly detrimental to the successful establishment of mangrove plantations.

3.3.3 Sedimentation: Rapid accretion causes complete or partial burial of seedlings and saplings. In raised areas, seldom inundated by tidal water, mangrove species can not be grown.

4. Prospect

4.1 Policies, legislation and institutional factors affecting the management of coastal forests and trees

In Bangladesh, policies relevant to the management of coastal forests include the Forest Policy (1994), Environment Policy (1992) and Coastal Area Policy (2005). The Forest Department is mainly responsible for their implementation, in collaboration with the Local Government Engineering Department (LGED), the Water Development Board (WDB) and NGOs operating in the region. The Forest Policy (1994) emphasizes the establishment of plantations on all newly accreted lands in coastal areas and reflects government commitment to conserve the resources and ecosystems of the Sundarbans (Statement No. 9). Other statements on the establishment and management of "priority protection areas", the conservation of natural forests, use of state-owned reserved forests for forestry purposes only, and promotion of ecotourism are directly relevant to the conservation of mangrove forests in Bangladesh. Protection against natural disasters is the main objective of the Environment Policy (1992) which focuses on maintaining ecological balance and achieving sustainable development. It encompasses important aspects such as coastal forests, wildlife, biodiversity, the marine environment, and ecologically critical zones. The Coastal Area Policy (2005) also emphasizes sustainable development and, thus, supports the establishment of plantations, the conservation of existing forests and the preservation of habitats in the coastal region.

4.2 Eco-tourism/conservation tourism

Eco-tourism is a sustainable form of land use which contributes to environmental conservation while providing socio-economic benefits to indigenous people through non-consumptive uses and the values associated with natural biological diversity. If well managed, forest based eco-tourism protects fragile and unique ecosystems, wildlife habitats and watersheds. The exceptional scenic beauty and rich wildlife of coastal forests can attract many people to the area who seek outdoor recreation. Access to the forest by water transport is environmentally friendly. Eco-tourism or conservation tourism may be developed without damaging vegetation and wildlife. Because of weather conditions, activities must be limited to winter months when the climate is favorable.

5. Recommendations

5.1 Knowledge generation on the mangrove ecosystem through empirical studies

Although Bangladesh has a long and successful history of mangrove forest management, field staff achieved positive outcomes mainly through trial and error. This approach is expensive and time-consuming, knowledge generated can be inconsistent, and results can not readily be extrapolated. Because techniques can only be standardized through empirical studies, future mangrove rehabilitation projects need to address this issue.

5.2 Training of field staff

Once techniques are standardized, field staff and officers should be trained, particularly on mangrove ecology, to enable them to devise appropriate strategies.

5.3 Financial assistance for infrastructure development and rehabilitation programs

Given that coastal areas are generally remote, they have poor communication, weak infrastructure and harsh living conditions. For effective management of the coastal forest, an effort to increase financial support must be made to improve these aspects.

5.4 Participatory forestry

The raised lands which can no longer support mangroves require that they be replaced with other tree species for stability and continued protection. This land should be managed under a suitable participatory approach.

5.5 Tourism in Mangroves

The mangrove is a peculiar type of ecosystem in the inter-tidal region which thrives under unusual environmental conditions. These areas offer a wide range of outdoor recreation, including power boating, canoeing, fishing, collecting mollusks and crustaceans, picnicking, swimming, bird and wildlife watching, photography, and nature education. Mangroves can attract large numbers of tourists and be an important source of income. Thus, the potential for their development is significant, as has been done in many mangrove areas. However, care must be taken to ensure the preservation of these resources is compatible with tourism objectives.

5.6 Research

Silviculture treatment for mangrove forests is not yet fully developed. They have long been used without due attention to their rational management and conservation. Therefore, site specific research for the scientific management of mangroves should be undertaken.

6. Conclusion

The Bay of Bengal is one of the places most prone to tropical cyclones, accounting for

about 10% of the world's total. More than 40% of deaths from these events takes place in Bangladesh alone and about 90% of the casualties are caused by associated storm surges (Tarafder, 1977). Cyclone Sidr, with winds of 250 km/h (155 mph), struck Bangladesh on 15 November 2007. It killed around 3,500 people, made millions homeless, and destroyed a large part of the Sundarbans. Mangrove forests and plantations play a big role in reducing casualties and damage to property by mitigating the destructive forces of winds and tidal bores. A continuous tree cover, either with mangroves or other species, has to be maintained to minimize the loss of human life, cattle and property. Improvements can be made if practices are standardized but this necessitates knowledge on ecological processes, cooperation among national and international organizations, and adequate financial support.

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The Management of Forest Resources and Land in Brunei Darussalam[1]

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2/3. A paper presented at the APFNet's Workshop on Forest Resources Management in Asia and the Pacific, 8-19 November 2010, Kunming, China

Abstract

With a land area of about 576,532 hectares, Brunei Darussalam is the smallest country on the Island of Borneo and the second smallest in ASEAN, after Singapore. It is strategically located on the northwest coast, wedged between the Malaysian states of Sabah and Sarawak. In terms of forest cover, it has one of the highest percentages in the region - about 76% (438,000 ha) of total land area. These resources provide goods and services that are essential to the well being of the people, economic growth, environmental health, and ecological stability. As the government agency responsible for forest resources in the country, the Forestry Department (FD) will continue to manage these invaluable resources in a sustainable manner for the benefit of current and future generations. To date, some 235,520 ha of forested area (40% of land area) are either gazetted or notified as forest reserve. In line with the National Forest Policy of 1989, the FD aims to increase the proportion of forest reserve by 15% to an overall 55%. However, effective implementation will require stronger coordination and commitment among relevant agencies. In this regard, the Heart of Borneo Initiative is bolstering the efforts of the Forestry Department to achieve sustainable forest management. This paper highlights forestry development in the country; its forest resources; management strategies and practices; policies and legislation; as well as programs and initiatives to implement relevant commitments made at the national, sub-regional, regional and international levels, including conserving and protecting forest resources and their associated biodiversity.

1. The Development of Forestry in Brunei Darussalam

Forests played a significant role in the economic development of the country, particularly during the exploration and early production of oil, when considerable quantities of timber were required for construction. As a result, the Forestry Department was one of the first government agencies to be established in Brunei Darussalam, with the opening of an office in Kuala Belait in March 1933. Initially, the FD managed forests solely for their economic benefits – overseeing harvesting operations and collecting revenue from timber and other forest products. However, as the full range of economic, social and environmental values were better understood and recognized, authorities expanded their focus to include forest conservation and protection, along with its associated biodiversity, as part of sustainable forest management and of efforts to support the national aspiration to diversify the country's economy. This dual thrust is a challenge that the Forestry Department has to address in a wise and sound manner, in collaboration with other government agencies and stakeholders.

This paper highlights key initiatives and strategies to achieve SFM, describes forest policies and legislation, and provides an overview of conservation and protection programs/projects. It also notes some of the challenges and issues that the Forestry Department must face in carrying out its responsibilities and it underscores the importance of the Heart of Borneo Initiative in taking a holistic approach to managing forest land as a complement to the FD's efforts to achieve sustainable forest management.

2. The Forest Resources of Brunei Darussalam

2.1. Forested Area

Brunei Darussalam is one of the countries in the Asia-Pacific region with the highest forest cover - an estimated 76% [1](438,000 ha) of total land area.

2.2. Forest Types and Distribution

Table 1 shows the two categories of forests, namely swamp and hill forests. The former type is found in low-lying lands which are subject to tidal, seasonal, or continuous flooding: mangrove, freshwater swamp and peat swamp forests. The latter type generally grows on high and dry ground: tropical heath (kerangas), mixed dipterocarp and montane forests. Figure 1 describes their distribution across the country.

Table 1: The forest types in Brunei Darussalam

Forest Type	Description
Mangrove Forest	The mangrove forest occurs exclusively on coastal and riverine saline soils that are subject to the influence of sea tides. It can usually be differentiated from peat swamp which it typically borders.
Freshwater Swamp Forest	This forest type grows in valleys and along water courses that are prone to flooding, usually behind mangrove swamps.
Peat Swamp Forest	This forest is a natural development of freshwater swamps where accumulated leaf-litter has raised the peaty soil into a dome or lens, the top of which is above the normal level. They are the second most dominant forest type, next to mixed dipterocarp.
Kerangas Forest	The tropical heath forest, locally known as kerangas, occurs on infertile, base-poor soils derived from siliceous parent rocks which are usually overlain by a thin peaty soil, except in eroded areas.
Mixed Dipterocarp Forest (MDF)	The MDF is dominant forest type, the most uniform and the most complex. The uniformity lies in its structure and physiognomy - a dense, multi-storied high forest with an uneven canopy. Its complexity is manifested by its floristic richness.
Montane Forest	The montane forest can only be found 760 m above sea level and is confined to the Temburong district. The trees can reach more than 15 meters and are small and slender, with dense layers of undergrowth, including many palms. The branches are draped with mosses, liverworts and lichens.

1. Brunei Darussalam Peer Consultation Framework Report, 2007.

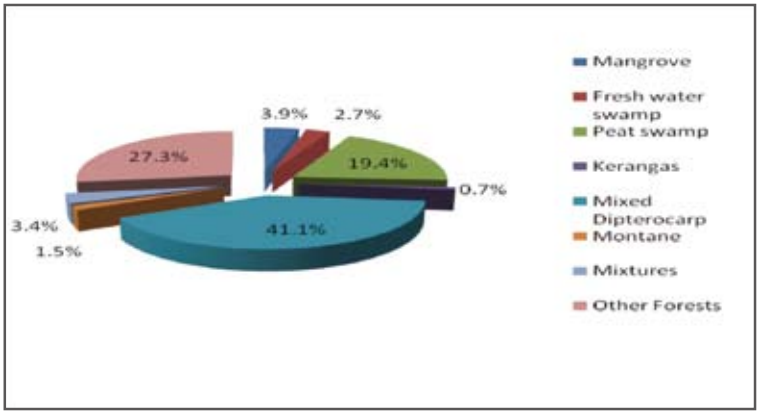

Figure 1: Percentage distribution of forest types of Brunei Darussalam

3. Management of Forest Resources and Forest Land

3.1. Management of Forest Resources and Forest Land

Chapter 46 of the Forest Act, Laws of Brunei, assigns primary responsibility for the management and administration of the country's forest resources to the Forestry Department. Among other provisions, the Act mandates authorities to reserve forest land, control the harvesting of forest products, and grant customary gratuitous rights to forest-dependent inhabitants. It also stipulates penalties for violations, and prescribes royalties.

The management and administration of forest resources are also guided by the 1989 National Forest Policy and the 20-year strategic plan for the sector (2004-2023). Legislation that strengthens the management of forest land are the Land Code and Land Acquisition Act; the Wildlife Act; the Town and Country Planning Act; the Antiquities and Treasure Trove Act; and the Wild Flora and Fauna Order 2007.

With regard to reserved forests, the Forestry Department has sole jurisdiction over planning, development and management. However, responsibility for forests on state land, reserved land and alienated land rests with the respective government agencies or individuals according to the terms under which they have been gazetted or allocated. The role of the Forestry Department in these areas is limited to overseeing the harvesting and utilization of timber and other forest products.

In addition to forest legislation and regulations, Brunei Darussalam has its own harvesting guidelines which aim to maintain or increase timber production in designated areas while balancing this activity with forest protection and biodiversity conservation. The guidelines cover every crucial aspect related to safeguarding the sustainability of the forest, i.e., from the construction of forest roads to logging practices and post-harvest reporting.

The primary purpose of the guidelines is to facilitate the day-to-day supervision of logging by field officers to ensure activities are in accordance with the Brunei Selection Felling System

— a system which involves a pre and post assessment of logging in the timber stand. The commercial species to be cut and those which are to remain for the next timber crop are marked, based on set limits of the tree's diameter.

To guard against illegal activities, the Forestry Department conducts regular patrols via air, land and water, either by its own enforcement unit or through joint operations with other agencies such as the "Jawatankuasa Protap Salimbada" whose members include the Royal Brunei Police Force, the Royal Brunei Armed Forces, the Survey Department, and the Land Department.

3.2. Management Vision and Mission

The vision of the Forestry Department is to achieve excellence in tropical forest management. It encompasses the complete spectrum of activities to reach this goal and, in doing so, sets an example for the rest of the world. The approach emphasizes the need to balance development with environmental conservation while, at the same time, to explore and utilize resources for socio-economic benefits, within the context of sustainable forest management.

The Department's vision and supporting mission statement are as follows:

Vision: Excellence in Tropical Forestry Management

Mission: To develop, conserve and manage the forest for social, economic and environmental benefits for the people, through sustainable forest management

Both statements aim to accomplish strategic objectives, referred to as the "forestry excellence agenda", which focus on the importance of forests in satisfying social, economic, and conservation needs, as follows:

3.2.1. Forests for posterity and prosperity: This objective strives to perpetuate forests as the country's natural heritage and the key to continued prosperity. It focuses on preserving and conserving their pristine state for the benefit of present and future generations.

3.2.2. Forests for sustainable production: This goal seeks to make and keep forest production sustainable, optimal, and environmentally friendly to ensure a continuous supply of timber to meet domestic demand. At the same time, forest plantations are being established to reduce pressure on the natural forest for wood.

3.2.3. Forests for economic strength: This objective intends to maximize the sector's contribution to national economic diversification and to its gross domestic product through the development of a down-stream industry and value-added products. It also calls for minimizing the impact of forest resources utilization as well as for developing eco-tourism and biotechnology.

3.2.4. Forests for public enjoyment: The purpose of this agenda item is to provide recreational and educational opportunities through the development of parks. The Department's role is to build and upgrade park infrastructures and facilities so as to make these areas more convenient and attractive to visitors.

3.2.5. Forests for international prestige: This objective aims to promote Brunei Darussalam as a world class model in forest management, given the country's commitment to conserve its green heritage and to keep a large portion of forests intact and pristine.

3.3. Management of the forest reserve

Of the country's 438,000 ha of forest, about 235,520 ha (40% of land area) are gazetted as forest reserve. In line with the 1989 National Forest Policy, 15% will be added to this area, to bring the total to 55%. For management purposes, these reserves are classified according to their functions, namely protection, production, conservation, recreation and National Park (table 2). Figure 2 shows their location.

Table 2 Classification, functions and area of forest reserves

Classification	Functions	Area (ha)	% of total
Protection Forests	- protect critical soil and water resources - keep the country green and beautiful and the climate invigorating - prevent or minimize floods, droughts, erosion, pollution, and similar environmental problems - contribute to the ecological stability of the country	18,562	3
Production Forests	- provide a sustainable supply of products from natural and planted forests	138,026	23
Recreational Forests	- promote social, psychological, physical, and economic well-being through outdoor recreation	4,211	1
Conservation Forests	- preserve and conserve biodiversity for scientific, educational and related purposes	28,511	5
National Park	- maintain biologically diverse plants and animals for the benefit of the present and future generations in areas that have distinctive formations and features of special interest	46,210	8

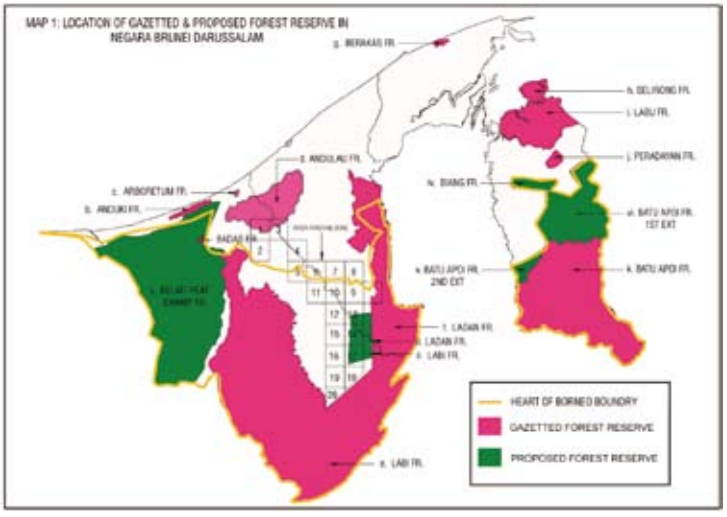

Figure 2 Current and proposed forest reserve

3.4. Management of planted forests in the inter-riverine zone

The establishment of large-scale planted forests for timber is based on several trial plantings of different species since the late 1960s. A comprehensive study in 1984 recommended development within the Inter-Riverine Zone (IRZ), between Tutong and Belait River. In order to ease the pressure on natural forests, the Forestry Department aims to plant at least 30,000 hectares to meet the country's industrial demand for timber and other raw materials on a sustainable basis.

Given the importance of the private sector in establishing planted forests, government is entering into partnership with companies to share management responsibilities. At the same time, enterprises are learning technical skills under the guidance of the Forestry Department.

4. Challenges in Forest Land Management

Although 40% of the country's land resources is protected by legislation and gazetted as forest reserves, huge tracts of forested area (35% of the land) remains outside these areas and are subject to other forms of land use. As noted earlier, the Forest Department is seeking to increase forest reserves by 15%, especially in the inter-riverine zone, to meet the national target and to protect government's investment in timber plantations. However, because land is a scarce commodity in Brunei Darussalam, development in other sectors such as agriculture, fisheries, industry, and housing poses a serious challenge in terms of preventing the conversion of forested areas into other land-uses.

5. Forest Conservation and Protection

Tropical rain forests cover only 6% of the earth's surface yet are home to 50% of all animal and plant species. They not only provide shelter and habitat for wild fauna and flora but also exchange large amounts of carbon dioxide for oxygen. In addition, rain forests provide food, raw material, and medicine.

Despite their importance, they are under the constant threat of destruction. Every year, about 20 million hectares are cleared worldwide due to logging and agricultural expansion. Most remaining rain forests are in developing nations where people depend on incomes from timber and farming for their survival. Because these needs often take precedence over conservation, destruction of these resources continues at an alarming rate.

In Brunei Darussalam, pressure on the natural forest is perhaps less than in other countries in the region, given that its economy is based on oil and gas. However, the need is still great to conserve and manage the country's pristine forest in a sustainable manner, for the range of social, economic, and environmental benefits they provide.

Over the years, the Forestry Department has been implementing various initiatives, projects and programs to ensure that forest resources continue to be developed and managed in a sustainable manner.

5.1. The Heart of Borneo

The Heart of Borneo (HoB) is one of the largest initiatives in the region, the aim of which is to conserve a large tract of mainly upland rainforest that spans the central highlands of Borneo and extends through the foothills into adjacent lowlands. The Forestry Department is implementing it in partnership with Indonesia and Malaysia. The initiative complements and strengthens current efforts to ensure that the forest resources in Brunei Darussalam are managed and developed in a holistic and sustainable manner, one which balances forest conservation with development. In this regard, the country has committed to place 58% of its land area under HoB management. Although the thrust of this endeavor is not new, the international attention and accolades it is receiving attest to the value of the work being carried out.

Prior to the HoB, the Forestry Department assumed responsibility for planting trees, with only the passive involvement of the private sector and other stakeholders. However, under this initiative, they have become proactive champions of forest rehabilitation and replanting projects.

The HoB National Council, established in April 2008, is comprised of ministries which have jurisdiction over land use management. It provides an important venue for policy and decision makers to exchange information, share ideas, and address land use management conflicts. In this way, it helps to guide the country's approach to sustainable development.

In addition to the HoB, the Department is implementing other policies, strategies, programs and initiatives, as described below.

5.2. Reduction in harvesting

Since 1990, up to and including present day, the annual allowable cut went from 200,000 m^3 to 100,000 m^3 as part of conservation efforts outlined in the 1989 National Forest Policy. The shortage of timber to meet domestic demand is offset by imports.

5.3. Increase in size of forest reserves

As noted earlier, the National Forest Policy contains a commitment to set aside at least 55% of the country's land area as forest reserves - an increase of about 15% from the area currently gazetted.

5.4. Limited issuance of logging permits/licenses

Since the 1980s, the Forestry Department has stopped issuing new logging permits or licenses, again, as part of a conservation strategy which limits the areas of production forests. To date, only 24 sawmills cum loggers are operational in the country.

5.5. Ban on the export of raw logs

The intention of this ban is to ensure a sufficient supply of forest products for future domestic requirements.

5.6. Enhanced Public Awareness

The Forestry Department will continue to promote public awareness of the importance of conserving and protecting forests as well as instill in people a sense of love and appreciation for nature. One of the annual programs it organizes is a celebration to commemorate World Forestry Day, an event which is followed-up with several other activities throughout the year: mass tree planting for all; nature camps and excursions for students; and the prestigious Princess Rashidah Young Nature Scientist Award for secondary school students, for example.

5.7. Improved forest productivity

Under its 5-year National Development Program, the Forestry Department will intensify its silvicultural treatment in logged-over forests in order to increase productivity. Moreover, harvesting will continue to be based on sound planning to meet the silvicultural objectives of the natural production forest reserves. The Department will also plant 30,000 ha with species which have a rotation period ranging from 15 to 40 years in order to reduce dependence on natural areas and guard against their depletion which was projected to occur by 2015 if logging continued at the rate of 200,000 m^3 per year.

5.8. Establishment of conservation areas

The Forestry Department has established ex-situ and in-situ conservation areas as well as delineated areas of genetic resources and germplasm collection, the latter of which is conducted by the Agriculture Department. Excellent examples of ex-situ conservation are selected tree species, palms, bamboo and rattans which are located at the Brunei Forestry Centre in Sungai Liang and plant collections which are found at the Forestry Branch in Sungai Lumut.

Ulu Temburong National Park is one of the country's largest in-situ conservation sites. Situated mainly in the Batu Apoi Forest Reserve in Temburong District, it is mostly a virgin jungle of forest types, classified according to altitude and soil. In addition to conservation, research, and education activities, the park also caters to ecotourism.

5.9. Development of the Brunei Tropical Biodiversity Centre

The National Development Program calls for the construction of the Brunei Tropical Biodiversity Centre, the objective of which is to ensure the conservation and sustainable utilization of biodiversity resources. Once built, the center will focus on research, education, and eco-tourism. The master plan for its development has been completed and construction of the main building started in early 2010.

5.10. Closer international and regional cooperation

The Forestry Department participates actively in regional and international meetings, conferences, symposiums and workshops. It is also strengthening cooperation with other research institutions and organizations as part of its commitment to enhance capacity building, facilitate technology transfer, and exchange information on forestry issues, including forest conservation.

6. Conclusion

Defining and implementing sustainable forest management is one of the most critical challenges facing not only Brunei Darussalam, but other countries as well. The Forestry Department is under pressure to meet growing demand for the range of forest products and services, enhance the sector's contributions to society, and maintain the integrity of forest ecosystems - all at the same time. Recognizing and responding to these sometimes conflicting needs, the FD is stepping up efforts to put sustainable management at the core of forest resource development and administration of forest land. With this commitment, it acknowledges the importance of the Heart of Borneo Initiative, of supportive forest legislation, of public participation in forestry activities, and of workshops such as this one to share experiences and to facilitate the attainment of the FD's vision – Excellence in Tropical Forestry Management.

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Cambodia Country Report

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1. Introduction

Cambodia's forests perform a range of important ecological, social and economic functions for the development of the country. The establishment of management objectives for the sector is based on forest endowment, population pressure, wood demand, sustainable exploitation and socio-economic development, among other factors. Within the comprehensive policies and strategies of the Royal Government of Cambodia (RGC) for growth, forests are emerging as a key component, including in terms of alleviating rural poverty and improving livelihoods.

During 30 years of conflict and instability, forest cover declined in Cambodia from 73% of total land area in 1969 (13.2 million ha) to 61.15% - a drop of 11.85%. More recent data will be available once the forest resources assessment for 2005/2006 is released. Forests are classified and managed according to their major functions (production and protection) and according to whether they are slated for conversion to other land uses such as agriculture.

Cambodia has recently introduced criteria and indicators (C&I), developed by ITTO, to report on progress toward sustainable forest management at national and forest management unit levels. However, data could not be collected on some aspects, a weakness that underscores the need for more research. In addition, some concessions have been suspended pending preparation and approval of new strategic forest management plans (SFMP) and environmental and social impact assessments (ESIA). However, others are operating under revised plans.

Conservation areas have increased to more than 4.6 million ha, some 41% of total forest cover and 25% of land area. In terms of protecting genetic resources, biodiversity and watersheds, the RGC has established three protected forests as well as 35 forest seed source areas and wildlife reserves across the country. These forests are under the jurisdiction of the Forestry Administration (FA) and cover 1.5 million ha (1995-2004). Substantial parts of protected areas and protected forests, including national parks, wildlife sanctuaries and biodiversity conservation forests, are managed in partnership with the Ministry of Environment and national and international NGOs such as WWF, World Conservation Society, Conservation International, and Flora and Fauna International.

Deforestation and forest degradation are of major concern in Cambodia as well as at the global level and efforts are being made to plant thousands of hectares of exotic and native species. To develop the national economy, alleviate poverty and, at the same time, ensure a sustainable supply of forest resources for future generations, community forestry has become a priority. Traditional user rights of local communities and indigenous groups are also recognized in the Forestry Law, allowing them to collect dead trees, non-timber forest products (NTFP) and timber for household consumption without permission. Customary rights are also ensured in concession areas, where it is prohibited to harvest trees which communities traditionally tap for resin.

Timber is the most valuable forest product in terms of its contributions to the economy and the foreign currency it brings to the government. In Cambodia, large quantities are used for housing, furniture, bridges, wagons, sleepers, and to frame the construction of concrete buildings. However, the export market can be unstable, depending on trends and on decisions of the RGC based on its investment policies.

In order to strengthen the ties between scientific research and policy development,

the Forestry Administration works with several international institutions and NGOs. Cambodia also cooperates closely with other ASEAN countries and at the global level on the conservation and sustainable management of forest resources. In this regard, it acknowledges the multiple interests of the many stakeholders involved. It has integrated its forest policy into ASEAN discussions and, under the ASEAN-German Regional Forest Program (ReFOP), led efforts to implement the international forest regime in the region. Moreover, in 2003, Cambodia was chosen to head the ASEAN Ad-hoc Working Group on International Forest Policy Processes and, during the 8th meeting of the ASEAN Senior Officials on Forests in 2005, was elected chair. Recently, with support from the ASEAN Secretariat, ReFOP and the International Tropical Timber Organization (ITTO), the FA organized a workshop on a clean development mechanism for forestry projects in the region - a significant step toward closer cooperation in this area.

At the international level, Cambodia participates actively in the forest policy dialogue of the United Nations Forum on Forests (UNFF) and is committed to reporting annually to the secretariat. During its 6th session in February 2006, the ASEAN community selected Cambodia to represent it and deliver its statement.

2. Main challenges and threats facing the forestry sector

Cambodia's forests face a number of significant challenges and threats, including the following:

- Population growth is not only increasing demand for timber and non-timber forest products, but it is also accelerating forest encroachment as people search for additional land to grow crops. Such pressure is leading to the degradation of natural forests, a situation which adversely affects economic development and livelihoods.
- Commercial logging over the past decade has reduced the availability of forest resources, and has caused a decline in timber production, a trend that has had significant impact on industry. To ensure a sustainable future supply of raw material for economic development, efforts are required to promote forest rehabilitation, forest plantations, and more efficient wood processing.
- Illegal and uncontrolled logging in remote areas is now high on the political agenda and is receiving international attention. It is therefore important to identify and effectively address the root causes. Governance, improved collaboration at border crossings, and stronger procurement policies are a few of the measures that need to be undertaken.
- Although it is recognized that the forest sector plays an important role in national development and poverty alleviation, implementation of forest policies is weak.
- Invasive species are posing a major threat to forest health and biodiversity in some areas and forest fires and haze continue to be problematic.
- Forest research and technology development are not sufficiently applied.

3. Forestry research and development

Despite financial constraints, the Forestry Administration has contributed significantly to forestry research in Cambodia on a wide range of topics such as watershed management, in-situ and ex-situ conservation, silviculture techniques, forest management, social forestry and the Clean Development Mechanism (CDM). In collaboration with the Forest Products Research Institute of Japan, it is investigating the effects of the changes in water circulation in the Mekong River basin on three forest types: moist evergreen, semi-evergreen, and deciduous. Interim results were presented at a regional conference in Phnom Penh in 2005. With support from ITTO, FA officials and stakeholders were trained in reduced impact logging techniques - a project which increased knowledge of how to move towards sustainable forest management.

4. Forest planning

Forest management planning at the division level is a critical component of national efforts and, in this regard, the FA has developed guidelines for local implementation. In 2005, divisions began formulating medium term plans, including annual plans, for 2006-2011. These plans will be revised in the fourth year and new ones will be drafted to cover the next five-year period. As part of a comprehensive long term strategy, 20 to 25-year national forest management plans are also being formulated and made to be consistent with the Rectangle Strategy of the RGC.

In January 2002, the government suspended harvesting in forest concessions until concessionaires completed strategic forest management plans and environmental and social impact assessments for the FA's approval. The process takes place in three phases: the concession level (25 years), the compartment level (5 years), and the coupe operational level (annual). The first stage was completed and found to be consistent with the procedures established under the Forest Concession Management and Control Pilot Project. Results indicate that the forest areas can support harvesting on the basis of a 25-year rotation, but FA approval is pending the preparation of compartment level plans. Where forest concession areas are of poor quality or cannot be managed in a sustainable way, logging will not continue and severe restrictions will be imposed for the next 15 to 25 years. Currently, no concessions have proceeded to the second stage.

Besides the above noted plans, the FA promotes the development of plans for community forests, the management of which is more participatory and decentralized. Most community forestry sites are still in the early stages, some have prepared plans, but none have yet been approved.

5. Forest policy and legislation

The RGC endeavors to implement a coordinated set of forest laws, programs, action plans, and institutional arrangements to achieve the national goals of environmental protection, biodiversity conservation, poverty reduction, socio-economic development and good governance. Forest policies and other supportive measures such as FLEG1 are:

- The national forest policy statement (2002), articulated in the second Socio-Economic Development Plan (SEDP II), contains goals on forest conservation, good governance, socio-economic development, and poverty reduction, among others.
- The 1998 reform of the forestry sector calls for the sustainable management of resources.
- Order No. 02 (6 January 1999) and declaration No. 01 (25 January 1999) concern measures to mitigate forest anarchy.
- Declaration No. 06 (25 September 1999) focuses on curbing land encroachment.
- Codes of practice for logging operations in the context of sustainable forest management were adopted in July 1999.
- The sub-decree on forest concession management was adopted in February 2000.
- A logging moratorium was imposed on concessionaires in January 2002 until new forest management plans and environmental and social impact assessments are in place.
- A review of the performance of concessionaires in 1999/2000 resulted in the termination of agreements for 17 companies (3.5 million hectares) and the need for 12 companies to develop new management plans, environmental and social impact assessments and investment agreements.
- Order No. 01 (09 June 2004) combats forest land encroachment and land grabbing.
- Order No. 01 (10 May 2006) prevents the clearance of forest land for real estate.
- Order No. 02 (20 September 2006) deals with chainsaw utilization.
- Circulation No. 02 (26 February 2007) addresses illegal encroachment on state lands.
- Establishment of national committees and provincial subcommittees in 2004 to assist the FA to combat forest land encroachment and land grabbing.
- The sub-decree on the registration and demarcation of the permanent forest estate was passed on 1 April 2005.
- Phases I (2002) and II (2008) of the Rectangular Strategy support reforms and action plans of the RGC, including forest reform.

The Forestry Law, passed in 2002, enshrines the principles of sustainable forest management: public participation in decision-making; the classification of forests into production, and protection and those designated for conversion; recognition of traditional user rights of local communities; promotion of community forestry; new rules and regulations for the management of forest concessions; and clear procedures and penalties for forest offences. Regulations and institutional arrangements are currently being developed to support effective enforcement of this legislation.

The RGC has declared its intention to reorient forest policy towards increasing reforestation through the participation of communities, armed forces and all levels of authority (RGC, 2003). It is also strengthening support to community forestry which, to date, has been largely

assisted and financed by NGOs. Furthermore, many forest concessions have been cancelled or suspended due to unsatisfactory performance and some of their management plans are being reviewed and revised to comply with the Forestry Law and new concession guidelines.

6. Forest Governance (Non-law enforcement)

6.1 Forest governance

To achieve sustainable forest management, enforce laws, and prevent crime in Cambodia, the government continues to:

1. promote the participation of all relevant stakeholders (other ministries and institutions, development partners and civil society organizations) by

- strengthening interagency cooperation
- building the capacity of national and subnational committees to resolve conflicts over forest land and to prevent/suppress illegal forest encroachment and land clearance
- improving collaboration between the national authority and relevant ministries to resolve conflicts over land use
- promoting local participation in forest management and conservation

2. improve the rule of law by

- implementing ongoing reforms to ensure that people of every status obey the law
- providing support, including financial, to crackdown on forest crime
- improving communication with the judiciary to resolve forest crime cases

3. improve transparency by

- making data, information and statistics on forest crimes accessible to the public
- continuing to publish forestry magazines every six months and forestry statistics every two years
- upgrading the Forestry Administration's website
- providing forestry information, documents and regulations to those who request it
- sharing information and experiences with EA FLEG, EU FLEGT, ARKN-FLEG, ASEAN-WEN, ITTO, FAO and the World Bank.

4. improve responsiveness by

- establishing a central and local mechanism to review and verify information received on forest crime and to address illegal activities reported in the media
- maintainning effective communication and collaboration with the Rapid Response Mechanism of the Council of Ministers.

6.2 Forest landowners

Article 58 of the Cambodian Constitution and Article 15 of the Cambodian Land Law state that forest resources are state property. They are managed by three agencies as follows: the permanent forest estate under the purview of FA (MAFF); flooded forests, including mangroves, under the purview of the Fisheries Administration (MAFF); and 23 protected areas, such as national parks, wildlife sanctuaries, landscapes and multiple-use areas, under the Ministry of Environment, as stipulated in Article 3 of the Forest Law.

Permanent forest estates consist of forest reserves and private forests. For local communities living within or near reserves, the state recognizes and ensures their traditional user rights. Individuals who plant trees on private land or on state forest land where they have been granted user rights, can maintain, develop, use, sell and distribute their products. Others who are allowed to plant trees on state forest land are the FA or communities which hold rights consistent with the Forest Law, the sub-decree on community forest management, and guidelines on community forestry. To date, in cooperation with other government agencies, local authorities, communities and development partners, 406 community forestries was established in permanent forest reserves which cover 383,051 hectares; involve 87,300 households from 861 villages and 218 communes; and entail the participation of 89 districts and 20 provinces (DFC, 2009).

7. Forest Law Enforcement

Efforts to enforce laws and to monitor and report on forest crime include:

- setting up appropriate systems and facilities
- enhancing communication with judicial bodies
- improving collaboration with other law enforcement agencies, including across borders
- developing a mechanism to combat illegal land encroachment and land grabbing
- establishing a working group on law enforcement.

7.1 Forest crime prevention strategies

The FA's strategies to prevent forest crimes are to:

- improve collaboration between relevant government agencies and NGOs
- build capacity within the forestry sector to manage conflict
- strengthen governance
- promote forest certification
- improve international and cross-border cooperation
- develop measures to balance industrial demand for timber with sustainable supply.

7.2 Timber theft prevention

The FA has instructed all staff, especially in local inspectorates, cantons, divisions and triages, to prevent and suppress illegal forest activities, including timber theft. In this regard, fifty-five divisions have prepared forest management plans which contain prevention and suppression provisions.

7.3 Security management and crime prevention techniques

With support from the Japan International Cooperation Agency (JICA), the FA organized a training course entitled "Forest Crime Investigation and Documentation" to strengthen the capacity of local FA offices in forest law enforcement. In January 2007, it also cooperated with the ASEAN-WEN Support Project, the Wildlife Alliance, and the California Department of Fish and Game (funded by the United States Agency for International Development) to conduct training on "Nature Crime Investigation" in Sihanouk province. Officers attended from the FA, the General Department of Customs, the Gendarmerie and the Economic Police Department. In October 2009, the FA offered staff another course on law enforcement, including security management and crime prevention techniques. This initiative was part of a project funded by the ITTO, entitled "Strengthening Capacity of Forest Law Enforcement and Governance in Cambodia". Resource persons came from the FA, the Ministry of Environment, the Ministry of Justice, the Ministry of Land Management, Urban Planning and Construction, and the Cambodia CITES Management Authority. International experts also participated.

7.4 Community forestry

The RGC and the Danish Agency for International Development funded a program to improve the knowledge and skills of village committees and residents to manage and develop community forestry. Recently, the FA added the following components to the National Forest Program:

- community forestry identification and formalization
- community, institutional and livelihoods development
- community forestry development support.

The second component aims to optimize the sustainability, productivity and quality of forest products for both domestic and commercial use and to improve governance by

- promoting inclusive participation and consensus building
- increasing the accountability of CFM committees to their members and stakeholders
- engaging in participatory planning and budgeting
- enhancing accounting and financial management
- sharing benefits equitably among government, CFM committees and individual members
- fostering transparency and communication through regular reporting
- writing sound proposals
- protecting forest resources, enforcing rules and managing conflict.

7.5 Extension services on forest law

The FA provides extension services to stakeholders, including local authorities and government agencies at provincial, district and commune levels to improve awareness of forest law and promote participation in forest management.

7.6 Sustainable forest management

The FA prepares management plans for its divisions (forest management units) which take into account the need to monitor, assess and report on specific elements of sustainable forest management such as criteria and indicators, timber supply and demand, forest law enforcement, and governance.

8. National Forest Program

The RGC established a Technical Working Group on Forestry and the Environment (TWG-F&E) as a coordination mechanism to support development activities within the sectors (details available at www.twgfe.org). A four-year Forestry and Environment Action Plan (2007-2010) and one-year work plans and indicative budgets for 2007 and 2008 specify 26 priorities within the six NFP programs listed below.

- Forest Demarcation, Classification and Registration
- Forest Resource Management and Conservation
- Forest Law Enforcement and Governance
- Community Forestry
- Capacity and Research Development
- Sustainable Forest Financing

Finalization of the NFP is the critical next step in the FA's efforts to promote sustainable forest management in Cambodia up to 2029 and beyond.

9. Forest Financing

How sustainable forest management is financed, whether through income generation, government funding or development aid, determines the nature and extent of NFP activities to be implemented. As a cross-sectoral component, forest financing is integrated into five sub-programs:

- government financing (government cost)
- income from national forestry
- income from the private sector, including community forestry
- donor financing

- innovative income sources (such as eco-tourism, game, and carbon trade).

10. Institutions

10.1 Government Agency

The Forestry Law (2002) reformed the institutional framework for the sector by establishing the Forestry Administration to replace the former agency. As noted below, the structure and functions of the new organization have been streamlined to better address forestry issues at both central and local levels. More resources and responsibilities have also been delegated to field offices to improve forest management across the country.

On the one hand, central administration develops national forest policy and legislation, is responsible for national and international coordination, guides strategic forest management planning, and is in charge of human resource development, governance, and monitoring/ evaluating forestry programs. On the other hand, local administration implements programs under a decentralized system in which personnel and other resources are transferred to different regions of the country. These employees are critical to the effective management of forest resources in their respective jurisdictions.

Because institutional reforms in the natural resources sector have progressed rapidly, the FA is struggling with its new role as service provider and extension agent. The National Forest Program offers an effective, internationally agreed framework for policy formulation and implementation but the concept needs to be clarified and capacity to make it operational needs to be built. Multi-stakeholder approaches are also required, including strategies that promote the involvement of those who work in other sectors, to develop policies which are cross-cutting.

10.2 Participatory forest management

The Royal Government of Cambodia fully recognizes the importance of community involvement in managing and using forest resources. Indeed, it promotes this approach in both policy and field implementation. The concept was introduced in the early 1990s and, since then, more than 200 community groups are protecting and using some parts of the forest throughout the country.

The Forestry Law (2002), the Sub-decree on Community Forestry Management (2003), and the Cambodia Millennium Development Goals (2004) all attest to the government's support to wide participation. The Community Forestry Guidelines and the National Community Forestry Program which are being formulated to support implementation are additional measures. Although the government is not able to enter into formal agreements until these guidelines are approved, the FA is collaborating with various stakeholders to assist with the establishment of community forests, where appropriate. In this regard, JICA is helping to build the capacity of staff to better serve the communities involved.

A recent survey found that the country had 406 community forestries in permanent forest reserves which cover 383,051 hectares; involve 87,300 households from 861 villages and 218 communes; and entail the participation of 89 districts and 20 provinces (DFC, 2009).

10.3 Stakeholders and partners

The forest policy seeks to involve the range of stakeholders in sustainable forest management, such as the Cambodia Timber Association (CTA), private enterprises and households. Through bilateral and multilateral assistance, development partners are instrumental players in the sector as well. Many local and international non-governmental organizations, mainly concerned with social welfare, are registered in Cambodia. However, only a few are working in forestry.

11. International conventions

The RGC is signatory to a number of international laws, treaties and conventions. Those that relate to natural resource management and environmental protection are as follows:

- Cooperation for the Sustainable Development of the Mekong River Basin (1995)
- ASEAN Agreement for the Conservation of Nature and Natural Resources (ratified in 1986)
- Convention on Biological Diversity (1995)
- International Tropical Timber Agreement (1995)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (1997)
- United Nations Framework Convention on Climate Change (1996)
- The Convention on Wetlands of International Importance (1999)
- The Convention to Combat Desertification and Drought (1994)
- The Protection of World Cultural and Natural Heritage (1992)
- Convention on the Prevention of Pollution by Dumping Waste and other Matter (1994 and later)

12. Support to the forestry sector

The Forestry Administration, as the RGC's main government player in the sector, enforces laws and implements projects in cooperation with the following international organizations:

- **Conservation International:** Cardamom Conservation Program protects and conserves the forest and wildlife in Koh Kong, Kompong Speu and Pursat Provinces.
- **DANIDA:** Cambodia Tree Seed Project identifies important tree genetic resources and builds FA capacity in tree seed management. Kbal Chhay Watershed Management Project protects the area and plans for its sustainable development.
- **GTZ:** Projects include the rehabilitation of degraded forests, development of the forest sector, and monitoring forest cover.

- **ITTO:** Supports training on reduced impact logging and on the sustainable management and utilization of NTFPs.
- **JICA:** Builds capacity building and trains Forestry Administration staff, including at local levels, in various forest-related subjects.
- **Wildlife Alliance:** Mobile protection groups receive support from the armed forces and military police.
- **World Bank:** The pilot project on Forest Concession Management and Control provides technical and material assistance to formulate guidelines, conduct forest inventories, and train officers. It also helps to suppress illegal logging through the Forest Crime Monitoring and Reporting Unit of Forestry Administration.
- **Wildlife Conservation Society:** Biodiversity protection in Mondulkiri province.

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China Forest Resources Management

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1. Forest Resources Status

China lies in the east part of Asia and to the west coast of the Pacific Ocean. China's territory covers an area of 9.6 million square kilometers with over 18,000 km of coastal lines. Thanks to her rich land resources and varied geographical and natural conditions, China has unique forest landscapes. Distributed from north to south are coniferous forest, mixed coniferous and broad-leaved forest, deciduous broad-leaved forest, evergreen broad-leaved forest, monsoon rain forest and rain forest.

At present, China has 195.45 million hectares of forests. The forest coverage is 20.36%. The total standing stock volume comes to 14,913 million cubic meters and the forest stock volume is 13,721 million cubic meters.

According to the "Global Forest Resources Assessment 2005" published by NU FAO, China's forest area accounts for 4.95% of the world's total, ranking the fifth behind Russia, Brazil, Canada and the United States of America. China ranks the sixth in the world in terms of forest stock volume, following Brazil, Russia, Canada and the United States of America and Democratic Republic of Congo. The total area of plantations ranks China the first in the world. The forested area per capita in China is 0.145 hectares, making up 23.24% of the world average. China's forest stock volume per capita is 10.151 cubic meters, taking up 14.81% of the world average.

1.1 Forest Land Area

The forest land area totals 303.78 million hectares in China, of which 181.38 million hectares is forested land, 4.82 million hectares is open forest, 53.65 million hectares is shrub forest, 11.33 million hectares is unestablished forest land, 44.04 million hectares is land suitable for forest, and 8.56 million hectares is other forest land.

1.2 Tree Stock Volume

The total standing stock volume is 14,554 million cubic meters, of which forest stock volume is 13,363 million cubic meters, open forest stock volume is 114 million cubic meters, scattered tree volume is 745 million cubic meters, four-side tree volume is 332 million cubic meters.

1.3 Forest Area and Stock Volume

The forest area totals 193.33 million hectares, of which 181.38 million hectares is forested land. The forested area includes 155.59 million hectares of arbor forest, 20.41 million hectares of economic forest and 5.38 million hectares of bamboo forest.

Among the forested land, the area of protective, special purpose, timber, fuel-wood and economic forest is 83.08, 11.98, 64.16, 1.75 and 20.41 million hectares, respectively.

The total forest stock volume is 13,363 million cubic meters, of which 7,351 million cubic meters is the protective forest, 1,746 million cubic meters belong to the special purpose forest, 4,227 million cubic meters is the timber forest and 39 million cubic meters belong to the fuel-wood forest.

Among the arbor forest, the area and stock volume of young and middle-aged forest are

104.63 million hectares and 5,349 million cubic meters, respectively. The near-mature, mature and over-mature forest area is 50.96 million hectares with the stock volume of 8,014 million cubic meters.

1.4 Forest Resources Quality

The arbor forest stock volume is 85.88 cubic meters per hectare, of which the natural forest stock volume is 98.64 cubic meters per hectare and the plantation is 49.01 cubic meters per hectare.

The average annual growth of arbor forest comes to 3.85 cubic meters per hectare. Its average crown closure, DBH and trees number are 0.56, 13.3cm and 916 per hectare.

1.5 Forest Ecological Functions

Based on the data of the 7th NFI and the positioning monitoring of the forest ecosystem, the total carbon storage of the forest vegetation in China estimated by the Chinese Academy of Forestry, is about 7,811 million tons.

The amount of annual water conservation, soil conservation and fertilizer conservation, served by the forest ecosystem in China, are 494,766 million cubic meters, 7,035 million tons and 364 million tons, respectively. The amount of atmospheric pollutants absorption is annually 32 million tons and the annual dust retention amounts to 5,001 million tons.

In China, the forest ecosystem functions value is annually up to 10.01 trillion yuan, only served by carbon fixation and oxygen release, water and soil conservation, purification of atmospheric environment, accumulation of nutritious materials and biodiversity conservation.

1.6 Forest Resources Types

1.6.1 Natural Forest

The area of natural forest in China totals 119.69 million hectares, of which arbor forest covers 115.59 million hectares, taking up 96.57%; economic forest is 0.92 million hectares, accounting for 0.77% and bamboo forest is 3.18 million hectares, taking up 2.66%. The total natural forest stock volume comes to 11,402 million cubic meters and the per-unit-area stock volume is 98.64 cubic meters per hectare.

1.6.2 Plantation

The plantations cover an area of 61.69 million hectares, of which arbor forest comes to 40.00 million hectares, taking up 64.84%; economic forest is 19.49 million hectares, accounting for 31.59%; and bamboo forest is 2.2 million hectares, taking up 3.57%. The total stock volume of the plantations is 1,961 million cubic meters and the per-unit -area stock volume is 49.01 cubic meters per hectare.

1.6.3 Mangrove Forest

The total area of mangrove forest is 20,000 hectares, mainly existing in five provinces of Guangdong, Guangxi, Hainan, Fujian and Zhejiang.

1.6.4 Shrub Forest

The total area of shrub forest is 53.65 million hectares. The shrub forests are mainly distributed in the provinces of Tibet, Sichuan, Inner Mongolia, Xinjiang, Yunnan, Gansu, Qinghai and Guangxi, covering 75.28% of the total shrub forest area in the country.

1.6.5 Land Suitable for Forest

The area of land suitable for forest totals 44.04 million hectares, of which 13.21% are of high quality and 52.14% are of low quality. About 60% of the total land suitable for forest is distributed in the arid and semi-arid regions of the provinces of Inner Mongolia, Shaanxi, Gansu, Ningxia, Qinghai and Xinjiang.

1.7 Forest Resources Distribution

The geographical distribution of forests is closely related to the natural conditions, social and economic development. As a result of the influences of human activities and natural calamities over a long period of time and the unbalanced economic development among different regions, forests are geographically distributed unevenly in China.

1.7.1 Forest Distribution by Major Watershed

Of the 10 large rivers in China, the drainage areas of the 7 rivers like the Yangtze River, Helongjiang, Pearl River, the Yellow River, Liaohe, Haihe and Huaihe make up nearly 50% of China's total land area. The forest area and stock volume account for nearly 70% and 60% of the country's total respectively. The area and stock volume of the forests in the drainage areas of the Helongjiang River and the Yangtze River make up about 50% of China's total.

- The drainage area of the Yangtze River Valley is 180 million hectares, making up 18.75% of the total area in China. The forest coverage in Yangtze River valley is 34.37%, the forest area 61.87 million hectares and the forest stock volume 3,567 million cubic meters.
- The drainage area of the Yellow River Valley is 75.24 million hectares, accounting for 7.84% of the total area in China. The forest coverage in the Yellow River valley is 16.15%, the forest area 12.15 million hectares and the forest stock volume 465 million cubic meters.
- The area of Heilongjiang River valley in China is 93.13 million hectares, accounting for 9.7% of the total area in China. The forest coverage in the Heilongjiang River valley is 42.63%, the forest area 39.70 million hectares and the forest stock volume 3,317 million cubic meters.
- The Pearl River Valley covers an area of 44.21 million hectares, occupying 4.61% of the country's land area. The forest coverage in the valley is 49.25%, the forest area 21.77 million hectares and the forest stock volume 840 million cubic meters.
- The area of the Liaohe River Valley is 21.96 million hectares, occupying 2.29% of the country's land area. The forest coverage in the Liaohe River valley is 28.13%, the forest area 6.18 million hectares and the forest stock volume 162 million cubic meters.
- The Haihe River Valley area is 26.23 million hectares, occupying 2.73% China's land area.

The forest coverage in the valley is 14.63%, the forest area 3.84 million hectares and the forest stock volume 73 million cubic meters.

- The Huaihe River Valley area is 26.93 million hectares, occupying 2.81% of the country's land area. The forest coverage in the valley is 16.25%, the forest area 4.38 million hectares and the forest stock volume 157 million cubic meters.

1.7.2 Forest Distribution by Major Forest Regions

The land area covered by the 5 major forest regions in China makes up 40% of the country's total, the forest area accounts for more than 70% of the country's total and the stock volume more than 90% of China's total.

- Northeast Inner Mongolia Forest Region located in the provinces (autonomous region) of Heilongjiang, Jilin and Inner Mongolia. In this forest region, the forest coverage is 67.10% and the forest area is 35.90 million hectares and forest stock volume is 3,213 million cubic meters.
- Southwest Mountainous Forest Region covers some parts of the provinces of Yunnan and Sichuan and Tibet Autonomous Region. In this forest region, the forest coverage is 23.00% and the forest area 43.48 million hectares and forest stock volume 5,090 million cubic meters.
- Southeast Low Mountain and Hilly Forest Region covers all parts or some parts of the provinces (autonomous region) of Jiangxi, Fujian, Zhejiang, Anhui, Hubei, Hunan, Guangdong, Guangxi, Guizhou, Sichuan, Chongqing and Shaanxi. In this forest region, the forest coverage is 51.97%, the forest area 57.81 million hectares and forest stock volume 2,565 million cubic meters.
- Northwest Mountainous Forest Region consists of forest growing in the mountainous areas such as Tianshan and Altai in Xinjiang Uygur Autonomous Region, Qilianshan, Bailongjiang and Ziwuling in Gansu Province, Qinling and Bashan in Shaanxi Province. In this forest region, the forest coverage is 39.14%, the forest area 5.09 million hectares and the forest stock volume 5,310 million cubic meters.
- Tropical Forest Region covers some parts of the provinces (autonomous region) of Yunnan, Guangxi, Guangdong, Hainan and Tibet. In this forest region, the forest coverage is 44.57%, the forest area 11.80 million hectares and the forest stock volume 863 million cubic meters.

2. The Main Characteristics and Development of Forest Resources

The 7th NFI results show that China's forest resources have entered a fast development period. Between the two NFIs intervals, the forest area has a net increase of 20.54 million hectares, forest coverage has increased from 18.21% to 20.36%, up 2.15 percentage points and the forest stock volume has a net increase of 1,123 million cubic meters. The stock volume of arbor forest stand has increased by 1.15 cubic meters per hectare.

The outcomes of continual 7 times NFI have shown that great changes have taken place in China's forest resources. The forest area and stock volume have presented a gradual

increasing trend. Particularly since the end of the last century, the forest resources growth has sped up remarkably. And forest resources protection has entered a new developmental stage.

According to the 7th NFI results, China's forest resources during the two recent NFI intervals have the main characteristics and development tendency as follows:

2.1 Sustainable Growth of Forest Area and Stock Volume, Continuous Increase in Forest Coverage

The forest area has a net increase of 20.54 million hectares; national forest coverage has increased from 18.21% to 20.36%, up 2.15 percentage points. The total standing stock volume and forest stock volume have a net increase of 1,128 million cubic meters and 1,123 million cubic meters, respectively.

2.2 Area and Stock Volume of Natural Forest Increase Clearly, Especially in the Natural Forest Protection Area

The area and stock volume of natural forest have a net increase of 3.93 million hectares and 676 million cubic meters, respectively. In the Natural Forest Protection area, the net increase of natural forest area is 26.37% more than that of the 6th NFI, whereas, the net increase of natural forest stock volume is 2.23 times of the 6th NFI.

2.3 Fast Growth of Area and Stock Volume of Plantation, Growing Tendency of Potential Forest Resources

The area and stock volume of plantation have a net increase of 8.43 million hectares and 447 million cubic meters, respectively. The area of unestablished forest land is about 10.46 million hectares, of which, the area of arbor forest land is 6.37 million hectares, up by 30.17% over the 6th NFI.

2.4 Tree Stock Volume Growth Increases Considerably, Forest Harvesting Shifts Gradually Towards Plantation

The net growth of tree stock volume is approximately 572 million cubic meters and the annual harvesting stock volume is about 379 million cubic meters. So the growth volume is greater than its harvesting volume continuously and the surpluses between them has expanded further. The harvesting volume of natural forest decrease, whereas the harvesting volume of plantation increases. And the harvesting volume of plantation accounts for 39.44% of nationwide, up 12.27 percentage points.

2.5 Forest Quality Has Somewhat Improved, Forest Ecological Functions Are Being Gradually Strengthened

The stock volume and annual mean growth volume of arbor forest have increased about 1.15 and 0.3 cubic meters per hectare, respectively. The rate of mixed forest has increased by 9.17 percentage points. In the forested land, the proportion of public welfare forest has reached to 52.41%, up 15.64 percentage points. With the increase of the total forest, the improvement of forest structure and quality, forest ecological functions will be further enhanced. Based on the data of the 7th NFI and the positioning monitoring of the forest ecosystem, the

total carbon storage of the forest vegetation in China，estimated by the Chinese Academy of Forestry, is about 7,811 million tons. The amount of annual water conservation, soil conservation and fertilizer conservation, served by the forest ecosystem in China, are 494,766 million cubic meters, 7,035 million tons and 364 million tons, respectively. The amount of atmospheric pollutants absorption is annually 32 million tons and the annual dust retention amounts to 5,001 million tons. The forest ecosystem functions value is annually up to 10.01 trillion yuan, only served by carbon fixation and oxygen release, water and soil conservation, purification of atmospheric environment, accumulation of nutritious materials and biodiversity conservation.

2.6 The Proportion of Individual Management Area Increase Obviously, the Collective Forest Tenure Reform Shows Effects

In the forested land, the proportion of individual management area reaches to 32.08%, up 11.39 percentage points. The area of plantation and unestablished forest land accounts for 59.21% and 68.51% of the total in the country, respectively. The peasant household, as the main manager of forest, have played an important part in the forestry construction of our country.

3. Laws, Regulations and Procedures of Forest Resources Management

The laws, regulations and procedures of Chinese forest resources management mainly include the “Constitutional Law” and” Forest Law”, a series of regulations, rules and measures, promulgated by the State Council and the relevant documents, issued by the forestry authority departments. The “Constitutional Law” and” Forest Law” intensively reflect the overall requirements and objectives of the forest harvesting management in our country. And the relevant regulations, promulgated by the State Council, provide specific requirements and measures for the implementation of forest harvesting management. However, the relevant policy documents, issued by the forestry authority departments in accordance with industry standards and related laws, provide the operable advices for implementing forest harvesting management.

At present, the forest resources management procedures, issued by the State Forestry Administration, mainly include “Forest Resources Management Division Implementation Guideline”, “Country-level Sustainable Forest Management Plan Guidance”, “Forest Management Plan and Implementation Principles ”, “Forest Harvesting Operation Regulation ” and “Forest Protection and Utilization Plan” etc.

4. Forest Resources Harvesting and Utilization Management

4.1 Implementing Forest Harvesting Management System with the Core of Cutting Quota

Forest harvesting, as a key practice of forest scientific management and an important means of harmonizing forest three benefits, plays an important role in promoting sustainable forest management. The Forest Law, which was promulgated by China in 1985, had clearly showed

that the state strictly controls the annual forest harvesting according to the principle that the consumption of timber shall be lower than the growth. The annual forest cutting quota of the Seventh Five-Year Plan period had been approved by the State Council in 1987. After then, the annual forest cutting quota was planned and implemented from the Eighth Five-Year Plan period to the Eleventh Five-Year Plan period in China. After more than 20 years of efforts, the forest harvesting management system, with a core of cutting quota management and a focus of harvesting and transportation certificates and timber processing supervision, has been gradually established.

4.2 Launching the Forest Harvesting Management Reform

The forest harvesting management system with a core of cutting quota has played a tremendous role in effectively controlling the excessive consumption of forest resources. It also has made a huge contribution to the ecosystem restoration of forest resources. However, with the changes of forestry development environment and forestry strategic shift, its existing limitations have become increasingly prominent. To promote sustainable forest management and improve forest management level comprehensively, the forest harvesting management reform has been launched in recent years. And it has been tried out in some provinces of our country.

4.3 Achieving Remarkable Effects in Natural Forest Resources Protection Project

In 2000, the Natural Forest Resources Protection Project was launched in full swing, and it had been implemented in the key state-owned forest areas of the upper reaches of the Yangtze River of 6 provinces (autonomous regions and municipalities), middle and upper reaches of the Yellow River of 13 provinces (autonomous regions and municipalities), Northeast and Inner Mongolia, which include five provinces (regions), such as the Inner Mongolia, Jilin, Heilongjiang (including Daxinganling), Hainan, Xinjiang.

In the project area of Yangtze and Yellow River, the commercial harvesting of natural forest was stopped completely and the cultivation of forest resources was strengthened; In the project area of Northeast and Inner Mongolia, forest classification management was carried out, the timber yield has decreased substantially and the efforts of forest resources management and protection was intensified. The project has an accumulative investment of 118.47 billion yuan. After a decade of efforts, the great successes have been achieved in this project, including restorative increase of forest resources, gradual improvement of ecological environment, gradual increase of worker's income, continuous improvement of social security and substantial reduction of burden on forestry enterprises.

4.4 Wholly Promoting the Young and Middle Aged Forests Tending

It's a relative weak link in the forest management for the young and middle aged forests tending. A lot of forest management units are unwilling to do it for economic reasons. To promote young and middle aged forests tending, forest tending subsidy pilot has been carried out by the Ministry of Finance and the State Forestry Administration from 1999. The state has spent 500 million yuan on the financial subsidy of forest tending in 1999, and more than 2 billion yuan has been put into it in 2010.

5. Forest Land Management

The forest land is an important natural and strategic resource in our country. And it is also a foundation of forest existence and development. In addition, it plays decisive roles in protecting timber and forest products supply and maintaining ecological safety of territory. Finally, it plays special roles in addressing global climate change. Forest land management is an important content of forest resources management. There are two types of forest land ownership: the state-owned and collective. There are more than three types of forestland use rights, such as state-owned, collective, individual, and other use rights. Forest certification is a certificate of forest land ownership.

5.1 Realizing Standardized Management of Forest Land Expropriation and Occupation

Forest land expropriation and occupation is one of important reasons for its losses. Monthly report system of examination and approval has been currently established throughout the country for forest land expropriation and occupation. And its online approval is being promoted comprehensively. The forest land management must strictly observe the following principles:

- Construction projects should not or limit to expropriate and occupy forest land as far as possible.
- when it becomes unavoidable, forest land expropriation and occupation should be strictly applied and approved through legal procedures.
- some compensation, including vegetation restoration fees, shall be paid for forest land expropriation and occupation in advance, and it is considered as an important step for forest resources recovery. So the vegetation restoration fees should be paid before its application. Moreover, the forest land compensation for expropriation and occupation is just transforming from depending mainly on substantial to relying chiefly on ecological value.

Quota management should be carried out for forest land expropriation and occupation. The amount of forest land for expropriation and occupation will be planned or modified by the state, and it will be annually distributed to all provinces (autonomous regions and municipalities). And its amount should be controlled within 1.055 million hectares from 2011 to 2020.

5.2 A Large Number of Forest Land Begin to Transact Legally

Forest land transaction is a kind of transaction that the former owner or user legally transfers all or some use rights to other. The original use nature of forest land shall not be changed after transaction. Forest land transaction is an inevitable outcome in accordance with the development of socialism market economy after separating the ownership from use rights. It is also an important way to reallocate forestland resources. The Forest Law states that the use rights of forestland can be transferred, and it presents various forms, mainly including contract, lease, mortgage, transfer, auction, shareholding system and so on.

The forest land transaction rate of our country was low in the past for several reasons, such as ambiguous use rights. After the collective forest tenure reform, the collective use rights

become clear. And a series of management measures for forest land transaction had been issued throughout the country. Therefore, a large number of forest lands begin to transact legally.

6. Forestry Administrative Case Management

Forestry administrative case management refers to actions of the forestry administrative departments that occur in the process of planning, organizing, coordinating, supervising, controlling and dealing with forestry administrative case. Forestry administrative organizations deal with the forestry administrative case within their jurisdictions. The jurisdictions of forestry administrative case were implemented at different levels, including regional and designated jurisdiction. Forestry administrative case processing should be strictly in accordance with its procedure.

Forestry administrative case of our country was mainly investigated and prosecuted by the forest public security organizations at all levels and other forestry administrative departments. In 2009, about 10,384 cases were accepted, investigated and prosecuted by the forest public security organizations all over the country, including 784 criminal cases. So the forest land can be protected effectively.

7. Forest Resources Inventory

Forest resources inventory, a basic task of sustainable forest management, provides foundational data for forestry division, plan and program development, the impact assessment of forest resources and ecological environment, scientific research and forestry production. It is divided into three categories: National Continuous Forest Inventory, Forest Management Inventory and Forest Operation Design Inventory.

7.1 National Continuous Forest Inventory

National Continuous Forest Inventory is class one inventory for short. Its main purpose is to quickly and timely know about the general situation and dynamic of national forest resources (or large area) on the condition of guaranteeing accuracy quality. It also provides basis for analyzing national forest resources dynamic, formulating national forestry policies, planning national various forestry programs of country, provinces (municipalities and autonomous regions) and large forest areas and forecasting its trends. The basic unit of the National Continuous Forest Inventory is provinces (municipalities and autonomous regions) and large forest areas. Its main contents include forest area, stock volume, proportion and spatial distribution of all forest categories and types, growth, mortality, regeneration, harvesting and so on. This inventory should be carried out every five years.

7.2 Forest Management Inventory

Forest Management Inventory is class two inventory for short. Its main purpose is to know about the situation and dynamic of forest resources for the forestry production basic unit. It also provides basic data for analyzing and evaluating effects of management activities,

planning or modifying the sustainable forest management plan of management units, the overall design and county forestry division, program, base afforestation plan, establishing and updating forest resources archives, formulating forest cutting quota, making forestry project planning, regional and national economic development planning and forestry development planning, implementing forest ecological benefit compensation and forest resources assets management, guiding and regulating forest scientific management and so on. Its basic unit is the county-level administrative regions or forest management unit, such as state-owned forestry bureau, nature reserves and forest parks etc. Its tasks are to identify types, quantity and distribution of resources, including forest, trees, forestland, wildlife and microorganism, objectively reflect natural, social and economic conditions of inventory area, comprehensively analyze and evaluate forest resource and management status and propose some suggestions for cultivation, protection and utilization of forest resources. Its main contents include area, stock volume, growth, morality, site quality, ecological condition, the relevant nature, history, management and so on. This inventory should be carried out every ten years in general.

7.3 Forest Operation Design Inventory

The Forest Operation Design Inventory is the class three inventory for short. Its main purpose is to provide data for forest management operation design. Its one task is to identify forest resources quantity, timber outturn, growth condition, composition structure and spatial position for a harvesting area or a tending and improvement stand. Another is to determine methods and intensity for harvesting, tending and improvement. And the third is to estimate timber outturn, update measures and design process.

7.4 Forest Resources Supervision Management

Forest resources supervision management refers to supervision and inspection for forest resources protection, utilization and management. It is an important part of forestry administrative enforcement. It is also a significant measure for strengthening forest resources management. Forest resources supervision is in the charge of special organization in china. Many offices of forest resources supervision commissioner are established by the State Forestry Administration in all areas and relevant units. These offices are responsible to the State Forestry Administration. The State Forestry Administration set up forest resources supervision management offices, which are responsible for all coordination management and supervision. Since 1989, China has set up 15 offices of forest resources supervision commissioner in the country.

In addition, supervision organizations have been set up in the state-owned forest area of Northeast and Inner Mongolia and area below the provincial (district) level. The forest resources supervision organizations at all levels are established by the forestry authority departments at the next higher level and responsible to them.

Forest Policy in Indonesia on REDD

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1. Introduction

As the 3rd largest owner of tropical forests in the world, Indonesia must ensure that its forest sector not only continues to contribute to national development, but that it also maintains healthy ecosystems and helps to stabilize global greenhouse gas emissions. In this regard, efforts are now more important than ever to conserve forests, exploit resources in a sustainable manner, and control the conversion of forest land to agriculture and other purposes.

The National Forestry Act No. 41 (1999) and the Ecosystem and Natural Resources Conservation Act No. 5 (1990) provide the legal basis for forest management and the conservation of natural resources in Indonesia. The administration of state forests, including customary forests, and the supervision of activities in private forests fall under the authority of the Ministry of Forestry. These officials are also responsible for safeguarding the customary rights of indigenous people, where they exist, as long as they are not contrary to the national interest.

Population growth, decentralization, economic development, and priorities in other sectors are exerting significant pressure to clear forests or to encroach on them illegally. Because such activities often clash with efforts to mitigate climate change through REDD, close coordination and communication within and outside the forest sector, at national and sub national levels (provinces and districts), are paramount. To improve forest management and utilization, it is also important to provide local communities greater access to forest resources and to increase their participation in decision-making.

Given Indonesia's policies on community forestry, village forests, planted forests, and social forestry, among others, the country has demonstrated its strong commitment to accommodate different interests as it continues to develop the sector.

2. Deforestation and Forest Degradation

Decision 11/CP.7 of the UNFCCC defines deforestation as the conversion of forested land to non-forested land as a direct result of human activity. As expected, this decrease in forest cover significantly reduces the potential of forests to store carbon.

In Indonesia, deforestation is both planned and unplanned. In the latter case, causes include forest fire, encroachment, illegal logging and tree thinning that do not follow the principles of sustainability. It is also the result of an imbalance which occurred in the 1990s between industry's demand for timber and the capacity of the natural forest to supply it. Government responded to this problem by urging the private sector to establish plantations with fast-growing species to ensure a sufficient supply of raw material to produce both timber and pulp. However, this strategy did not eliminate the pressure on primary forests.

The policies to reduce unplanned deforestation include designating degraded and unproductive land for intensive silviculture treatments. Efforts are also being made to step up law enforcement to halt the conversion of forests to oil palm plantations. In addition, the Ministry of Forestry has issued various regulations to provide more privileges and better access to forest resources, including the opportunity to collaborate in the management of protected areas (MoF Regulation No. 19/2004), engage in community forestry, be involved

in forest plantations, and enjoy the benefits associated with customary rights (Government's Regulation No. 6/2007). In terms of minimizing planned deforestation, the Ministry of Forestry no longer grants permits to convert production forests into estate plantations beyond those which are located in approved areas.

3. Policy's Framework to Combat Deforestation and Forest Degradation

To address the challenges which the forestry sector has faced over past 10 years and continues to face, 8 main policies have been put into place. They are:

1. sustainable forest management, including the stabilization of forest area
2. forest rehabilitation and improving the carrying capacity of watersheds
3. forest protection and security
4. conservation of ecosystems and natural resources
5. revitalization of forests and forest products
6. empowerment of communities surrounding the forests
7. climate change mitigation and adaptation related to the forestry sector
8. more effective forestry institutions.

4. REDD in Indonesia (REDDI)

Climate change discussions are increasingly recognizing deforestation as a main issue. The World Resources Institute (2000) and the Intergovernmental Panel on Climate Change (2007) reported that deforestation contributed 17 to 18% of global greenhouse gas emissions, about 75% of which originated in developing countries.

At COP-11 of the UNFCCC in Montreal, Canada (2005), many countries supported the proposal to reduce harmful emissions from deforestation and forest degradation and agreed that all countries should participate in such a scheme. In response and, as part of its preparations for COP-13, Indonesia assessed its readiness to implement REDD both in terms of methodology and policy. The Ministry of Forestry coordinated this study which involved national and international experts and was funded by Australia, Germany, the United Kingdom and the World Bank. In July 2007, the Indonesia Forest Climate Alliance (IFCA) was established - a forum for government, the private sector, communities, academics, and international partners to discuss ideas and exchange information on REDD issues, including those identified in the study. A report entitled "IFCA Consolidation Report: REDD in Indonesia" (MoF, 2008) can be accessed at www.forda-mof.org. Key recommendations include the need to:

1. further develop the framework previously formulated by IFCA
2. continue consultation and technical analysis

3. implement pilot projects (demonstration activities), as per COP-13 decisions
4. build capacity at all levels
5. create a credible national framework to verify emission reductions
6. reduce GHG emissions in real terms.

In addition to COP-13 decisions about supporting REDD implementation in developing countries, REDD is an important aspect of climate change mitigation, as noted in the Bali Action Plan. Indonesia's strategy has been to adopt a phased approach, as follows:

Phase 1 (Preparatory): identify knowledge, technology and policies (2007 -2008)

Phase 2 (Readiness): prepare methodologies and policies for REDD I (2009-2012)

Phase 3 (Implementation): launch when REDD+ becomes operational (post-2012)

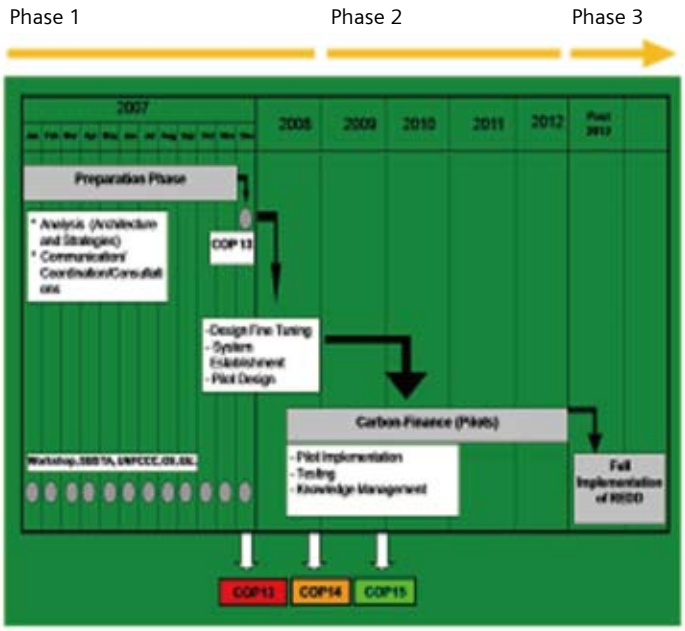

Figure1 Phased approach to REDD in Indonesia

5. Categories and Key Components of the Readiness Phase

In the readiness phase, Indonesia needs to prepare for REDD/REDD+ implementation: methodologies (RL/REL and carbon estimation, for example), a system to support MRV, policies to curb deforestation and forest degradation, institutional change, mechanisms to distribute funds and provide incentives, and participatory processes.

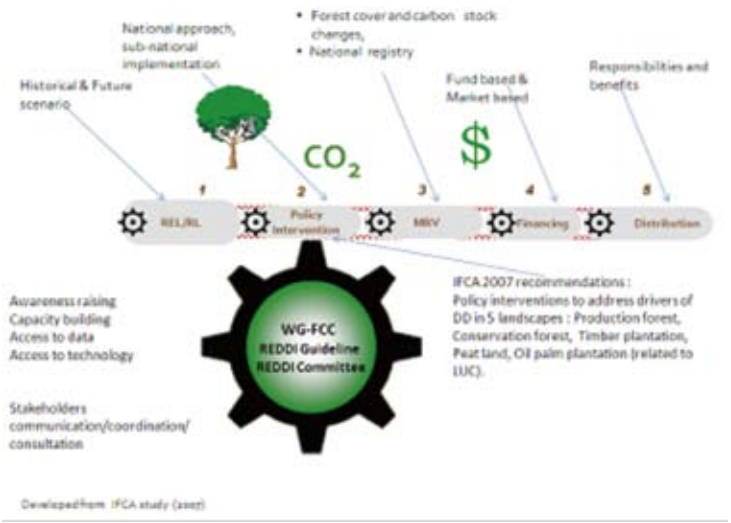

Figure 2 REDDI Strategy

The gradual and phased implementation of REDD Indonesia takes place at both national and sub-national levels (provinces/districts/management unit).

Strategies at the national level consist of 5 components, namely:

1. policy interventions to tackle the main causes of deforestation and degradation in forests designated for different purposes (conservation, protection, production) and land uses (peat land, conversion of natural forests into plantation forest and oil palm plantation)

2. preparation of REDD regulations such as implementation procedures and the establishment of a REDD Commission

3. development of methodologies concerning REL/RL and a system to support MRV

4. establishment of an institutional framework to implement REDD, including a national registry, funding, incentives, division of responsibilities, capacity building, and communication/coordination/consultation among parties

5. analysis of major aspects of REDD (REL/RL, MRV, costs and benefits, risks, impacts.

Strategies at the sub national level consist of 3 components:

1. development of methodologies concerning REL/RL and a system to support MRV

2. establishment of an institutional framework to implement REDD, including incentives, division of responsibilities, capacity building, and communication/consultation/ coordination among parties

3. development of demonstration activities (DA-REDD) which represent various bio-socio-geographic conditions.

6. Progress at the National Level

6.1 Regulations

As a part of Indonesia's readiness strategy, the Ministry of Forestry issued Ministerial Regulation No. P.68/Menhut-II/2008 on DA-REDD implementation; Ministerial Decision No. SK.13/Menhut-II/2009 on the establishment of a working group on climate change; and Ministerial Regulation No. P.30/Menhut-II/2009 on REDD regulations and guidelines. The working group has since finalized a proposal to set up a National Commission on REDD, comprised of representatives from relevant parties, the purpose of which is to oversee implementation.

6.2 Methodologies for REL/RL and for a system on MRV

The Ministry of Forestry, with support from Australia, has developed a Forest Resources Information System (FRIS) and the comprehensive Indonesia National Carbon Accounting System (INCAS) which integrates data from land use, land use change and forestry (LULUCF) or from agriculture, forestry, and other land use (AFOLU) to create a detailed profile of greenhouse gases. It uses remote sensing to capture information on forest and land management, soil and climate, and on vegetation biomass and growth.

Initial development of INCAS focuses on:

1. processing remote sensing data to analyze change in forest cover

2. researching and analyzing land use change related to carbon stocks and biomass

3. training and exchanging technical expertise between Indonesia and Australia

4. developing and assessing scenarios related to REL/RL for future policy formulation.

6.3 Cross-cutting elements

In addition to work being undertaken on REDD regulations and methodologies, two other initiatives are available to help countries to develop systems to support REL and MRV as they prepare for REDD implementation: the Forest Carbon Partnership Facility (FCPF) and the UN-REDD Programme. Both have many cross-cutting aspects so require strong synergies and close coordination. The FCPF supports (a) analysis of the main causes of deforestation and forest degradation, impacts, risks and benefits; (b) the development of REL and MRV systems; and (c) pilot or demonstration activities.

7. Demonstration Activities at the Sub-National Level: Da-REDD

As noted earlier, one of the decisions parties made at COP-13 was to help developing countries to reduce greenhouse gas emissions by curbing deforestation and reversing forest degradation. It was further agreed that assistance from developed countries could take many forms - financing, capacity building and technology transfer, among others.

One advantage of the DA-REDD approach is that parties learn by doing, develop commitment,

and build synergies. These aspects are important components of REDDI readiness strategies in terms of the many activities related to methodology and policies which involve a wide range of stakeholders.

Up to now, Indonesia has developed several DA-REDD, in collaboration with foreign governments, international NGOs and multilateral institutions, some of which are described below:

1. Indonesia/Australia Forest Carbon Partnership (IAFCP): The Kalimantan Forest Carbon Partnership (KFCP), under the auspices of DA-REDD, is located in Central Kalimantan Province. It is the first DA-REDD in the world, targeting to reduce GHG emissions from 130,000 ha of peat land forest through better forest management, forest fire prevention, and rehabilitation of the peat land hydrological system.

2. Indonesia/Germany Forest and Climate Change Program (FORCLIME): The DA-REDD is located is East Kalimantan Province. Activities focus on identifying and preventing the main causes of deforestation and forest degradation in conservation, protected and production forests.

3. Indonesia/ITTO DA-REDD in Meru Betiri National Park, East Java: The objectives are to reduce greenhouse gas emissions, maintain carbon stocks, and improve the livelihood of communities surrounding the forest by involving residents in project activities.

4. Indonesia/TNC DA-REDD in District of Berau, East Kalimantan: The project supports REDDI readiness at the district level as a part of the national readiness strategy.

Sustainable Forest Management in Malaysia

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1. Introduction

Malaysia is committed to implementing sustainable forest management (SFM), consistent with agreements reached during the United Nations Conference on Environment and Development (UNCED) and the World Summit on Sustainable Development (WSSD). While focusing on economic growth and development, Malaysia will give equal attention to both the conservation of its natural resources and to the social aspects of forestry.

Despite robust development in the last few decades, Malaysia has maintained about 59.5% or 19.52 million ha of its land area under forest cover, according to 2009 figures. Of that total, 74% or 14.39 million ha are gazetted as permanent reserved forest (PRFs) under the National Forestry Act (1984) and relevant state enactments and ordinances. Another 1.83 million ha outside PRFs are gazetted as national parks and wildlife sanctuaries.

Within the PRF, 3.21 million ha (22%) are designated as protection forest and the remaining 11.18 million ha (78%) as production forest where commercial harvesting on a predetermined rotation cycle is permitted. Production forest represents about 57% of the total forested area in Malaysia.

2. Policy and Legislation

Under the Malaysian Constitution, forestry comes under the jurisdiction of states which enact laws and formulate policy independently from the federal government. The executive authority at the national level only extends to providing advice, technical assistance and training, and to conducting research.

In order to adopt a coordinated approach to forestry, including on issues of common concern across sectors, the National Land Council (NLC) established the National Forestry Council (NFC) in December 1971. The NLC is empowered under the Malaysian Constitution to formulate national policy for the utilization of land for mining, agriculture and forestry. The Deputy Prime Minister chairs the NFC and members consist of the Chief Ministers of Malaysia's thirteen states, the heads of forestry services of Peninsular Malaysia, Sabah and Sarawak, the Minister of Natural Resources and Environment, and other federal ministers whose portfolios have an impact on the sector - finance, trade, plantation industries and commodities, science, technology and the environment, for example. It serves as a forum for federal and state governments to discuss and resolve forestry issues relating to policy, administration and management in a coordinated manner. Although the NLC must endorse all decisions of the NFC, responsibility for implementation lies with state governments unless it falls within the authority of the federal government.

In 1992, the National Forestry Policy (1978) was revised to include the conservation of biological diversity, the sustainable utilization of forest genetic resources, and the involvement of local communities in forest development.

Since the early 1900s, state authorities have been formulating and enforcing various forestry enactments and ordinances to ensure effective forest management and implementation of the National Forestry Policy. The adoption of the National Forestry Act and the establishment of wood-based industries strengthened regulations in the areas of forest management

planning and operations, making them more uniform across states.

Consistent with revisions made to the NFP, the National Forestry Act (1984) was amended in 1993 to provide more stringent penalties for forest crimes, including illegal felling of trees, and mandatory imprisonment for convicted offenders. The police and armed forces were given new powers of surveillance, with the aim of curbing illegal logging, encroachment, and timber theft.

In December 2007, Parliament passed the Malaysian International Trade in Endangered Species Act (2008) to guide implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. This legislation governs the administration and management of international trade in wild fauna and flora to ensure that the survival of any such species in the country is not threatened. Currently, the CITES Act (Act 686) is being implemented by various enforcement management and scientific authorities under the coordination of the Ministry of Natural Resources and Environment. Additional regulations are being drafted to strengthen this law.

3. Protection and Conservation Practices

Up to now, Malaysia has established 2.15 million hectares of conservation areas outside the PRFs which are fully protected by legislation - national parks, wildlife reserves, nature parks, bird sanctuaries and marine parks. Since the 1950s, Malaysia has also established a network of 139 virgin jungle reserves which cover 114,237 hectares. They serve as permanent nature reserves and natural arboreta, as control sites to compare harvested and silviculturally treated forests, and as undisturbed natural forests for ecological and botanical studies. With the inclusion of protection forests in the PRFs, total area designated for the conservation of biological diversity in Malaysia is estimated at 5.04 million hectares, representing 25.9% of forested land or 15.3% of total land area.

Malaysia has also drawn up a comprehensive list of plants and animals to be protected under law, such as the tiger, rhinoceros, slow loris and the bird-wing butterfly. In addition to adopting a National Policy on Biological Diversity in 1998 to identify and protect hotspots of high conservation value, it established the National Bio-Diversity and Bio-Technology Council in 2001, the purpose of which is to elaborate a strategy and provide direction for the conservation of biological diversity and the development of bio-technology in the country.

4. Forest Management Practices

To ensure a continuous supply of wood for timber production, harvesting is regulated by area control and/or volume methods which are prescribed in management plans. The National Forestry Council allocates an annual felling coupe to each state based on forest inventory data, the net area of production forest, and the silvicultural practices in place. Each state must then report to the Council on compliance.

Selective logging of Malaysia's natural inland forests ensures that the trees which remain standing reach commercial size in 25 to 55 years to allow for a second harvest - when the process is then repeated. In fact, this practice is a form of silvicultural treatment because

the gaps which are left after felling promote natural regeneration, as several studies have shown. Logged over forests are silviculturally treated to aid in their rehabilitation only when necessary.

Licences to log in the PRF are granted only in areas designated as production forests. Protection forests, however, are managed for conservation purposes. Under section 10 (1) of the National Forestry Act (1984), they are classified according to one or more of the functions listed below. The aim is to sustain the multi-functionality of the natural forest.

- Soil protection forest
- Soil reclamation forest
- Flood control forest
- Water catchment forest
- Forest sanctuary for wildlife
- Virgin Jungle Reserved forest
- Amenity forest
- Education forest
- Research forest
- State Park

These practices and other administrative policies and institutions are revised from time to time to meet prevailing challenges and requirements and to improve the management, conservation and sustainable development of Malaysia's natural forest.

5. Tree Planting Programme Along Coastlines

The role of mangroves in protecting coasts against strong waves, wind and currents is well known. On the northwest coast of Peninsular Malaysia, where mangrove forests are intact, the loss of life and damage as a result of tsunamis were less than in areas that were exposed to the open sea. Noting the need to take preventative action to minimize destruction in the future, the Prime Minister called for mangroves to be planted along several coastlines of the country.

In response to this directive, the Ministry of Natural Resources and Environment (NRE) formed a national task force, headed by its Secretary General, to take charge of the programme. As several federal and state agencies share jurisdiction over coastal areas, the main responsibilities of this task force are to coordinate, provide advice and monitor implementation. It held its first meeting in February 2005 which was attended by the various agencies, the private sector and non-governmental organizations. Two technical committees were established to assist with the work: the Planning and Implementation Committee, chaired by the Director General of the Forestry Department in Peninsular Malaysia; and the Research and Development Technical Committee, chaired by the Director General of Forest

Research Institute of Malaysia.

The national task force identified 2,010 hectares in Peninsular Malaysia for planting by the end of the 9th Malaysia Plan (2006-2010). Of this amount, 1,617 hectares are located in permanent reserve forests while another 393 hectares are on state land, outside the PRFs. In Sarawak, 230 hectares of poorly stocked mangrove forests will be enriched and about 596 hectares of coastline has been identified for planting in Sabah.

As of 2009, 4,931,168 trees (Rhizophora apiculata, Rhizophora mucronata, Avicennia spp., Bruguiera parviflora, Bruguiera cylindrical, Sonneratia caseolaris, Ceriops tagal, Casuarina equisetifolia) have been planted on 1,829.81 hectares of coastal area.

6. Forest and Timber Certification

To meet the demand for certified products in the context of sustainable forest management, the Malaysia Timber Certification Council (MTCC) was established in October 1998 as an independent organization to develop and operate a voluntary scheme. The first phase of the Malaysian Timber Certification Scheme (MTCS) began in October 2001 and was based on the Malaysian Criteria, Indicators, Activities and Standards of Performance for Forest Management Certification which drew on the ITTO Criteria and Indicators for Sustainable Management of Natural Tropical Forest.

A new standard, developed through multi-stakeholder consultations, was introduced in a second phase in December 2005, based on the principles and criteria of the Forest Stewardship Council (FSC). With regard to chain-of-custody certification, MTCC also follows FSC requirements when determining whether manufacturers of timber products are in compliance.

As of 2010, eight forest management units (4.20 million hectares of PRFs) have been certified as complying with the standards applied under phase 2, while one unit (0.623 million hectares of PRFs) is certified under the 2001 standards. As at December 2010, 160 timber companies have been awarded chain-of-custody certification.

MTCC joined the Programme for the Endorsement of Forest Certification schemes (PEFC) in November 2002 and, in March 2008, asked PEFC to endorse the MTCS so it could be given mutual recognition.

From July 2002 until the end of March 2009, Malaysia has exported 302,403m^3 of MTCS-certified sawn timber, mouldings, laminated finger-jointed timber, plywood and furniture to 21 countries: Albania, Australia, Belgium, Denmark, France, Germany, Greece, Indonesia, Ireland, Italy, Japan, Mauritius, the Netherlands, New Zealand, Norway, Poland, Singapore, South Africa, South Korea, the United Kingdom, and the USA.

A number of countries accept the MTCS as a legitimate scheme, as the following examples show. The Danish Ministry of the Environment included it in its guidelines for purchasing tropical timber and considers the MTCC certificate a solid guarantee of legal forest management, on its way towards becoming sustainable.

The report commissioned by the Central Point of Expertise on Timber (CPET), an expert group

appointed by the UK Department for Environment Food & Rural Affairs (DEFRA), concluded that the MTCC certificate provides the assurance of legally harvested timber. In addition, the Royal Horticultural Society in the UK listed the MTCS as one of seven certification schemes it recognizes in its Conservation and Environment Guidelines.

To date, the Keurhout Protocol for Sustainable Forest Management in the Netherlands lists six certified FMUs and 10 companies certified under chain-of-custody. Three FMUs and 123 holders of the MTCC certificate for chain-of-custody continue to be accepted under the Keurhout Protocol for Legal Origin.

The Ministry of Agriculture and Forestry in New Zealand lists the MTCS as one of seven recognized schemes in its Timber and Timber Products Procurement Policy Guidelines.

The French Ministry of Environment and Sustainable Development and the Ministry of Agriculture, Food and Rural Affairs list the MTCS as one of the acceptable certification schemes in the French National Timber Procurement Policy.

The Forestry Agency of the Ministry of Agriculture, Forestry and Fisheries in Japan also lists MTCS in its Guidelines for Verification on Legality and Sustainability of Wood and Wood Products.

In Germany, as part of a joint project, the city of Hamburg initially recognized the MTCS for a two-year period, beginning in June 2006. When the initiative ended, the city continued accepting MTCS-certified products under its procurement guidelines for public construction projects. A final decision to retain the scheme will be made once the PEFC Council determines whether to endorse the MTCS.

On 1 July 2008, new institutional arrangements were put in place, where the MTCC continues to be the national governing body but new certification bodies - accredited by Standards Malaysia - will receive applications, conduct assessments and issue certificates. These changes are expected to strengthen the MTCS and its acceptance in the international market.

7. Malaysian Timber Industry

Malaysia's timber industry plays an important role in the country's socio-economic development and is a major contributor to export earnings. The sector, including about 4,000 wood-processing mills, provides direct employment for 337,000 people or 3.5 percent of the nation's workforce. Its timber and timber products are exported to more than 150 countries.

In 2008, export earnings from timber amounted to RM 22.8 billion (US$6.9 billion). Wood furniture topped the chart at RM 6.9 billion (US$ 2.1 billion), followed by plywood at RM 6.3 billion (US$ 1.9 billion) and sawn timber at RM 3.1 billion (US$ 0.9 billion). Logs contributed RM 2.1 billion (US$ 0.6 billion), while the value of medium density fibreboard and builder's carpentry and joinery (BCJ) amounted to RM 1.2 billion (US$ 0.4 billion) and RM 1.0 billion (US$ 0.3 billion) respectively.

In recent years, the number of logs harvested from Malaysia's natural forests has steadily decreased, mainly due to effective implementation of SFM practices, including tighter laws, policies and regulations.

8. Forest Plantation Programme

Given the importance of the timber industry, as noted above, Malaysia is working out an aggressive programme to develop forest plantations because they yield a higher volume of timber per unit area in shorter time. Their establishment will thus relieve pressure on the natural forest and supplement the future wood supply of the country.

By the end of 2007, 0.38 million hectares of forest plantations had been established. Under the Forest Plantation Development Programme, Malaysia has set a target to plant another 25,000 hectares annually over the next 15 years, for a total of 375,000 hectares.

9. Research and Development

Current pressing issues such as deforestation, trade (especially timber certification), SFM and ecosystem management, are making forestry research and development (R&D) more crucial than ever before. Because Malaysia is always looking to improve its R&D capabilities as well as its forestry education and training programmes, domestic institutions are conducting joint forestry research with world-renown organizations such as Global Environment Facility, International Tropical Timber Organization, Japan International Cooperation Agency, Danish International Development Authority, International Plant Genetic Resources Institute , Food and Agriculture Organization of the United Nations, and the private sector.

Salient R&D programmes include topics related to the sustainable management of natural forests, silviculture in forest plantations, planting-stock in terms of production, biotechnology, landscape and recreation, conservation of forest biodiversity, discovery of natural products, wood processing, wood protection and construction applications, down-stream utilization of wood residues for composite products, and the use of biomass for pulp and paper and energy.

10. Forest Law, Enforcement and Governance Initiative

Malaysia, like other developing countries, places importance on the economic and social needs of the nation. In this regard, it bases decisions on land conversion according to a long-term plan, ensuring that development does not jeopardize the ecological balance of resources. For this purpose, the government has put in place legislation and guidelines to protect the environment.

Amendments to the National Forestry Act in 1993, more stringent law enforcement, aerial surveys and geographical information systems, coupled with remote sensing technology to monitor forest resources, have all contributed to significantly reduce timber theft and encroachment in the PRFs over the past ten years. The WWF and the World Bank's report (2001) on forest law enforcement in Peninsular and in East Malaysia concluded that "The incidence of forest crimes over the last several years show a declining trend. The level of illegal logging in the two regions, Sabah and Sarawak, is rather small, in the order of 1% or less, as compared to the legal wood products trade."

Recently, the Malaysian Government approved 62 new posts for enforcement officers

and legal officers to be attached to Forestry Department Headquarters and State Forestry Departments - a move which will definitely strengthen capacity in this area.

Apart from being a member of ITTO, Malaysia has participated actively in the following initiatives and dialogues:

- European Union Action Plan on Forest Law Enforcement, Governance and Trade (EU FLEGT) to combat illegal logging and reduce trade in illegally-harvested timber through voluntary partnership agreements
- Bilateral meetings and regional cooperation to foster legal and responsible trade in timber products through the Pan-ASEAN Timber Certification Initiative, among others
- East Asian FLEG Process.

Elephant Logging in Myanmar

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1. Introduction

1.1 General description of the country

Myanmar is situated in continental Southeast Asia, between 10° N and 29° N latitude and 92° E and 101° E longitude. With an area of 676,577 km^2, the country stretches 936 km from east to west and 2,051 km from north to south. It is bordered on the north and northeast by People's Republic of China, on the east and southeast by Lao PDR and Thailand, and on the west and northwest by Bangladesh and India. The southern parts of the country lie along the coast of the Bay of Bengal and the Andaman Sea.

The country is hilly and mountainous, with most parts located in highland areas. Myanmar possesses a range of ecological conditions, rising from the sea along the southern coasts to snow-capped mountains that reach as high as 6,000 m near the Chinese border on the northern tip.

Myanmar's climate is greatly influenced by its topography and the monsoon system. Its three seasons are distinct: hot (mid-February to mid-May), rainy (mid-May to mid-October) and cold (mid-October to mid-February). Temperatures vary widely, from less than 0° C in the northern highlands to more than 40° C in the central dry zone. Average annual rainfall is only about 500 mm but the coastal regions receive as much as 5,000 mm during the monsoon season.

Myanmar has 135 ethnic groups, the majority of which are Kachin, Kayah, Karen, Chin, Bamar, Mon, Rakhine and Shan. Population reached about 54.3 million in 2004-05, with a density of only 80 persons per square kilometer. Growth rate over the same period was 2.02% (FD, 2006).

1.2 Forest resources

Forests cover about 33 million hectares or 50% of the country. They are mainly natural forests, about 45% teak (Kyaw, 2003). Table 1 shows the 7 major types which vary depending upon rainfall, temperature, topography and soil conditions (FD,2006).

Table 1. Forest types by area and percentage

Forest Type	Area (km^2)	Percent (%)
Tidal, beach and dune, and swamp forests	13,750	4
Tropical evergreen forests	55,004	16
Mixed deciduous forests	134,068	38
Dry forests	34,377	10
Deciduous Dipterocarp forests	17,187	5
Hill and temperate evergreen forests	89,378	25
Fallow land	9,983	2
Total	353,747	100

1.2.1 Permanent forest estate

Myanmar's permanent forest estate (PFE) consists of reserved forests, protected public forests and protected areas. Table 2 shows that, in 2006, they covered 211,360 km^2 or 31.33% of land area (FD, 2006) - slightly below the 35% called for in the 1995 Forest Policy.

Table 2. Status of the permanent forest estate in 2006

Legal status	Area (km^2)	% of land area
Reserved and protected public forests	158,060	23.36
Protected areas	53,300	7.97
Total PFE	211,360	31.33

The species of flora and fauna are diverse, the former of which consists of 1,347 species of big trees, 741 species of small trees, 1,696 species of shrubs, 96 species of bamboo, 36 species of rattan, and 841 species of orchids. Of 2,088 tree species, 85 produce multiple-use timber of premium quality.

1.2.2 Timber resources

Together, close canopied, broad-leaved, mangrove and coniferous forests comprise about 2.25 billion m^3 of standing timber. The annual growth of closed broad-leaved forests alone adds around 31 million m^3, to this figure, based on an estimated growth of 1.5 m^3/ha of all trees of DBH 20 cm and up (Kyaw Tint, 2000).

2. Institutional Capacity

Consistent with the Myanmar Forest Policy, four government units within the Ministry of Forestry are responsible for sustainable forest development: the Planning and Statistics Department (PSD), the Forest Department (FD), the Myanmar Timber Enterprise (MTE) and the Dry Zone Greening Department (DZGD). Their main responsibilities are the following:

- PSD coordinates activities and ensures collaboration within the Ministry on the implementation of the government's plans and programs for the sector. It also examines all projects which involve assistance from UN organizations, international NGOs and development partners before submitting them to the Minister for approval.
- FD is tasked with the management, administration and protection of natural forest resources and for the planning, management and establishment of forest plantations.
- MTE is charged with harvesting and processing timber and with marketing wood-based products locally and abroad.
- DZGD has the mandate to reforest degraded forest lands and restore the environment in the dry zone of Central Myanmar.

In practice, FD and MTE are the two main organizations responsible for developing the sector. FD has a staff of 15,076 (557 officers and 14,519 subordinates), while MTE's staff totals

46,411 (1,131 officers and 45,280 subordinates) (FD, 2005).

3. History of Timber Extraction

The Burmese kings basically designed the forest administration system to tax and control forest use. King Alaungpaya made teak a royal property in 1775 and controlled its extraction. Documents on timber trade date back to the Konbaung Dynasty in 1808 A.D. when teak became popular in western countries.

Systematic forest management in Myanmar started in 1856, in the colonial days, with special emphasis on natural teak forests. Although teak plantations were promoted throughout the country's history, long-term teak production from natural forests has been the primary objective of forest management. In this regard, FD adopted the Myanmar selection system (MSS) for the commercial harvesting of teak and other hardwoods.

Around 1860, FD started granting 12-year timber leases for the exploitation of teak. In 1913, 15-year leases were given to five big European firms: Bombay Burmah Trading Co.; Messrs. Steel Bros. & Co. Ltd.; Messrs. MacGregor & Co. Ltd.; Messrs. Foucar & Co. Ltd.; and Messrs. T.D. Findlay & Sons Ltd. A few local contractors were also given harvesting leases, most of which were only for 1 to 5 years.

During the Japanese occupation from 1942 to 1945, Nippon Burma Timber Union (NBTU) was formed and virtually monopolized timber extraction and trade. In 1946, the British government reoccupied the country and formed the Timber Project Board, comprised of the former European firms, to manage and control the extraction, milling and marketing of timber (Tan Chein Hoe, 1956).

When Myanmar gained independence on 4 January 1948, the new government issued an order, effective 10 April that same year, to replace the Timber Project Board with the State Timber Board (STB) which focused exclusively on teak (Tan Chein Hoe, 1956). A few indigenous firms continued the extraction of teak on short-term contracts.

In 1974, the STB was reorganized under the socialist economy and renamed State Timber Corporation (STC), responsible for the extraction of teak and other timber. In 1990-91, with decentralization and the shift to a market economy, STC became Myanmar Timber Enterprise. It comprises eight departments: Administration, Planning and Statistics, Extraction, Export Marketing & Milling, Local Marketing & Milling, Wood-based Industries, Engineering, and Accounts.

4. Present Logging Practices

Currently, MTE is engaged in timber harvesting but also contracts local entrepreneurs to carry this out on its behalf. In natural teak forests, the Myanmar selection system is used. It is based on a 30-year felling cycle and involves the removal of trees above a prescribed diameter - girth at breast height of 7'6" (229 cm) in good teak forests and 6'6" (198 cm) in poor teak forests (FD, 1962). Although a girth limit of 6'0" (180 cm) is generally imposed for harvesting most non-teak hardwoods, variations are allowed, depending on the condition of the forest

and the silvicultural characteristics of the species. As part of its management responsibilities, FD enumerates 100 percent of the trees, down to a fixed size, for future yields. It girdles teak trees and marks non-teak hardwoods for selective felling.

Around 1 June each year, the FD issues permits to the MTE to enter the forest, equipped with girdling and selective felling notebooks. Fellers use chainsaws and are instructed to follow girdling serial numbers and felling guidelines set forth in the Myitmakha Manual 1939, as revised in 1945 (Tin Aung Hla, 1995). The stump should be as close to the ground as possible but not exceed 6 inches, leaving the lower blaze of the tree intact. Bucking must conform to the "Logging Rules and Standards for Jungle Rejection of Teak Logs" (FD, 1941).

Transport methods depend on the distance to destinations. Short hauls entail stumping, i.e., dragging logs away from the stump of a felled tree to a landing site where FD and MTE measure them for payment of royalties and dragging charges (Thein Pe, 1995). Four stumping methods are used.

- **Animal logging with elephants and water buffaloes:** Elephants drag logs in mountainous areas and buffaloes are used in flat areas. The average annual haul of an elephant is about 150 hoppus tons (270 m^3) and that of a pair of buffaloes is about 50 hoppus tons (90 m^3) (Thein Pe, 1995).
- **Mechanical logging:** Mechanical logging started in 1955 but this method is seldom economically feasible because MSS limits the yield per unit area.
- **Elephant-cum-mechanical logging:** Elephant-cum-mechanical logging is the most effective and economical (Thein Pe, 1995). It involves elephants dragging logs from the stump to wider drag paths and then hauling them by crawler tractor or rubber-tired skidder to the measuring point or car-base (loading site).
- **Cable logging:** The systematic use of cable logging was introduced in 1979, with the inauguration of a technical co-operation project between Japan and Myanmar. The technique, however, is not applicable in forests where felling is carried out on the basis of individual tree selection. The best result, in this case, is obtained by combining cable logging and elephant logging.

For the transportation of logs over long distances, FD and MTE take final measurements for royalty and other payments at the car-bases. MTE's Extraction Department grades and classifies them also at this time. The means of transportation used, sometimes in combination due to local conditions and market demand, are boat, train and truck (Hla Moe, 1995).

5. Elephant Logging

5.1 Background

Elephant logging has existed since the days of the ancient kings of Myanmar and has become indispensable. After annexation of the country in 1886, up to 1942, five European firms worked most teak forest under long term leases, extracting more than 380,000 hoppus tons annually. Buffaloes haul logs of less than one ton over flat terrain and short distances.

Before World War II, the timber industry owned about 10,000 elephants. Some 6500 were full-grown and used in the extraction of teak and hardwood logs; about 2500 were trained calves between the ages of 5-18 years to transport baggage and supplies; and the remaining 1000 were calves at heel. During the war (1943-1945), many elephants died of overwork and under-nourishment, while some were poached for their valuable tusks. By the end of 1945, only about 2500 full-grown elephants were available for timber extraction.

5.2 Elephants Owned by MTE

Elephants are classified according to age, as noted below, and experienced trainers teach them to work as they reach a prescribed number of years.

- Up to 4 years - Calves at heel (CaH)
- 4 to 18 years - Trained calves (TC)
- 18 years and above - Full-grown (FG)

Table 3 shows the number of elephants that MTE owned between 2000 and 2009 (Myo Myint, 2009). Within this period, trained calves decreased by 14.3%, while full-grown and calves at heel rose by 5.7% and 46.3% respectively - a total net increase of only 2.4%.

Table 3. Number of State-owned Elephants From 2000 to 2009

Year	Full-grown (FG)	Trained Calves (TC)	Calves at heel (CaH)	Total
2000-2001	1710	833	188	2731
2001-2002	1715	820	193	2728
2002-2003	1722	807	196	2725
2003-2004	1760	763	212	2735
2004-2005	1766	772	200	2738
2005-2006	1788	760	219	2767
2006-2007	1781	742	234	2757
2007-2008	1814	716	239	2769
2008-2009	1808	714	275	2797

5.3 Classification of State-owned Elephants

According to the capacity of full-grown elephants to haul timber, they are graded as:

- 1st Class – stout and healthy, (30-40 years), generally able to haul or drag log >2 tons
- 2nd Class – stout and healthy, (between 25-30 and 45-50 years), generally able to haul log 1-2 tons.

- 3rd Class – fit elephants, (between 18-25 and over 50 years), generally able to haul log <1 ton.

The retirement age is generally fixed at 60 but those deemed to be unfit or are disabled receive treatment at separate sick camps.

5.4 Manuals and Instructions Related to Timber Harvesting

The extraction process requires that personnel not only abide by the forest law and regulations, but that they also adhere to MTE's Extraction Manual, Standing Orders, and Departmental Instructions.

- **The Extraction Manual** stipulates the duties and responsibilities of extraction officers, extraction procedures, rafting programs, and the railing of logs. It also prescribes the use of elephants in terms of working conditions, training, treatment and medical care, and it outlines the allowance of annual rewards to mahouts, among others. Further, the Manual provides guidelines for the preparation and submission of monthly and annual reports and accounts.
- **Standing Orders for Subordinate Staff (SOS)** describe in detail the occupational principles and procedures, pre-harvest plans, stages and procedures of timber extraction, care and management of elephants, and mechanical logging.
- **Departmental Instructions** cover aspects ranging from office inspection to field operations, including estimation of future yields, harvesting stages, royalty payments and the capture, training, care and management of elephants.

5.5 Elephant Extraction

Timber extraction in Myanmar is primarily carried out by elephants because they are the most suitable means for applying the MSS. Operations usually begin in June, when the first rains clear the forest debris. Table 4 shows the number of MTE-owned and privately owned elephants working in logging operations between 1999 and 2009 (Myo Myint, 2009).

Table 4. MTE-owned and Privately Owned Elephants Deployed for Timber Logging

Year	MTE-owned (FG)	Privately owned	Total
1999-2000	1575	1360	2935
2000-2001	1590	992	2582
2001-2002	1595	1328	2923
2002-2003	1602	1328	2930
2003-2004	1640	1130	2770
2004-2005	1646	1534	3180
2005-2006	1668	1130	2798
2006-2007	1658	947	2605
2007-2008	1657	947	2604
2008-2009	1651	947	2598

Elephants operating singly or in tandem are used to drag logs from stump to landing. This method favours downhill logging to minimize the load on the animal. On slopes, the elephant tends to drag at a low angle to the contour and its path is usually less than 1 meter. This approach requires care on two fronts:

- Elephants traditionally drag downhill and into and along watercourses. Care is therefore needed to select appropriate entry and exit points to avoid damage to the stream banks or bed.
- Feeder roads from past logging commonly follow streams and may be within the buffer zone. If they cannot be relocated, care is needed when reopening, using and closing these roads to avoid pushing earth or debris into the stream or damaging the banks.

Direction of the dragging will be generally downhill and through the buffers to the watercourses. Location, length and direction of tracks, while often stipulated in the Operational Harvesting Plan, will be ultimately determined in a field assessment and will depend on the experience of the supervisor and mahout to select the optimal course.

Drag paths should be planned to:

- minimize the work load on the elephant and maximise safety
- minimize damage to productive forest area
- reduce damage to residual stands and regeneration on the ground
- minimize dragging distance and soil damage along skid tracks
- improve the economics of harvesting.

Elephant dragging generally entails the use of footpaths and small lanes rather than the construction of paths or small roads. Activities should be limited to cutting brush by hand, removing obstacles, and trimming stumps to ground level. Stakes, logs or other material may be placed on the downhill path to prevent logs from rolling sideways. In addition, brush cuttings and wooden rollers should cover the path to reduce friction.

Drag paths should be angled across the slope rather than run straight up and down when slopes are steeper than 30% or 17 degrees. Slopes should not exceed 25-35% (14-19 degrees) when dragging downhill or 10-15% (6-9 degrees) when dragging uphill. Paths should not be longer than what is reasonable for the elephant to drag a log in one operation. If not possible, temporary dumps should be considered to break the operation into manageable lengths.

Where necessary, elephants are permitted to drag through buffer areas into and down stream beds but the path must be carefully selected to minimize impact. Options include choosing a stable and low bank to enter and leave the water bed; closing and stabilizing the path if its use creates an erosion channel or a continuous rut that may erode; and moving to an alternate location.

According to Departmental Instructions, elephants must be between 18 and 60 years of age to extract timber and training can only start when a calf reaches 5 years. The annual workload of an individual elephant must not exceed 10% of prescribed limits: 100-180 tons

of teak logs or 180 to 240 tons of other hardwoods. They should work no more than 5 days/ week (160-180 days per year, with a 2-month rest in the hot summer months) and no more than 3 consecutive days before resting 1 day (2 if pasture is not immediately available). A rest of 1 week should be given each year, even during the October working season. Each day, elephants should

- start work early
- have a bath before work
- be greased where the harness may rub
- rest 30 minutes after working 3 hours
- stop an hour before noon
- have the harness removed after work
- have its skin pressed and squeezed with salt to reduce stress
- be guided to pasture and left to feed with forelegs chained.

To guard against anthrax, all elephants must be inoculated once per year by veterinary assistants or other authorized officials when they are resting in camps. Exceptions are those deemed unsuitable for treatment: pregnant elephants in their 14th month, sick, injured, weak or tired animals, and females with calves at heel. After inoculation, elephants must be given rest for about 14 days. When necessary, veterinary assistants must inoculate elephants against haemorrhagic septicaemia, monitor symptoms, and report progress to the MTE managers concerned.

Healthy elephants should be moved to a new camp, away from an infectious area. If one dies of an infectious disease or if there is threat of an outbreak from cattle at nearby villages, all elephants must be moved to a new camp, stop work, and be watched carefully.

A book is kept on each elephant, from birth to death, to record every inspection and medical treatment.

Elephant dragging operations should entail:

- the use of a proper harness to prevent injury
- dragging pans, sledges and sulkies to minimize skidding
- the provision of adequate water, food, and veterinary care
- the use of two elephants in tandem, with the tusker ahead, when the load is too heavy for one animal.

6. Efficiency and Impacts of Elephant Logging

In the context of MSS, logging by elephant is found to be more suitable than mechanical extraction which is constrained by poor weather conditions, hilly terrain, and lack of

resources such as fuel and hard currency to buy replacement parts.

When the ground is wet, elephants can skid logs better than mechanical skidders. Moreover, the cost of extraction by elephant is significantly lower and the ground is subjected to the least disturbance. These animals are also indispensable in freeing logs from obstructions in streams in order to reach the depots located in main rivers. Moreover, elephants can be employed for nine months (June to February), while skidders can only operate 5 months (January to May). However, elephant logging is slow compared with mechanical extraction which can produce large quantities in a short period. Therefore, MTE has combined both practices. In sites where logs are floated, elephants are used for skidding and clearing obstructions in streams. Where temporary roads are built with dozers, machines are used for skidding logs and loading trucks. This arrangement causes the least disturbance to the ground and residual trees.

7. Conclusion

Myanmar produces timber for both domestic and export markets, while conserving the soil and water of the forest. Harvesting can be the most damaging aspect of forest management, unless it is carried out with due concern for the environment. In this regard, various regulations and instructions govern timber extraction in the country, including the fixation of allowable cuts, silvicultural treatments, harvesting plans, road construction, and elephant management and care. However, many of these rules need to be revised to reflect current national and international thinking on the best way to achieve sustainable forest management.

In 1996, the Food and Agriculture Organization of the United Nations published a Model Code of Practice for Forest Harvesting and the Asia-Pacific Forestry Commission released a Code of Practice for Forest Harvesting in Asia-Pacific a year later. In 2000, Myanmar developed the National Code of Forest Harvesting Practices which is based on these 2 publications. The document is a major step forward in the country's attempt to increase production in an environmentally friendly manner.

Because elephants can negotiate difficult terrain, the environmental footprint they leave behind is minimal if harvesting is correctly carried out. In particular, elephant logging is consistent with the application of reduced impact logging and the principles of sustainable forest management.

Given that logging by elephants is widely recognized as the most suitable approach under MSS in the natural forests of Myanmar, their health and care are extremely important. Therefore, medical clinics or mobile units should be available in major camps to look after both the animals which belong to MTE and those owned by the private sector.

Today, of Myanmar's estimated 10,000 elephants, about 3000 are government owned, 2000 are privately owned, and 5000 are in the wild. Although special attention is given to the conservation of wild elephants and the care of working elephants, FD and MTE are becoming concerned about dwindling populations. Improved health care and working conditions for elephants and the creation of special areas for wild elephants might be explored in time.

The role of elephants in timber extraction is crucial and the benefits from using them are far

reaching. They have been described as amphibious, weatherproof, multipurpose and four-legged machines which need no mechanical maintenance or spare parts. They use the forest itself as their fuel supply, and work 30 to 40 years - three times the life span of machines. They can also reproduce, are intelligent, environmentally friendly, easy to manage and cost effective.

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Forestry Development in Nepal

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1. Introduction

Nepal is situated between China in the north and India in the south, east and west. The country has diverse physiographic zones, climate as well as altitudes and spans 147,181 sq.km - only 0.09% of the earth's land mass. It harbours more than 2% of the world's flowering plants, 4% of its mammals and 8.5% of its bird species. In total, 342 species of plants and 160 species of animals are endemic to Nepal (HMG/N, 2002:3). Its unique features, with about 118 ecosystems, 75 vegetation types and 35 forest types (Stainton, 1972 cited in NBS, 2002), rank it twenty-fifth in the world in terms of biodiversity.

In 1960, Gurung divided Nepal into five physiographic zones: Terai, Inner Terai, Hills, Himal and Bhot (Trans-Himalayan) but, in 1986, the Land Resources Mapping Project (LRMP) divided it into Terai, Siwalik, Mahabharat (Middle Mountain), High Mountains and High Himalaya. In 1976, Dobremez identified six bioclimatic zones, based on 189 vegetation types (Table 1).

Table 1: Bioclimatic zones

Zones	Altitude (m)	Description
Tropical	below 1000 m	Sal forests and Savanna
Subtropical	1000-2000 m	Schima-Castonopsis and Chirpine forests
Temperate	2000-3000 m	Quercus and Rhododendron forests
Sub-alpine	3000- 4000 m	Fir, Birch and Juniper forests
Alpine	4000-5000 m	Alpine grassland and rangeland
Nival	above 5000 m	Permanent snow

Source: TISC, 2002.

The National Forest Inventory (1998) reported that Nepal had around 4.27 million hectares of forest (29% of land area), 1.56 million hectares of scrubland and degraded forest (10.6 %), and 1.7 million hectares of grassland outside the protected area (12%). However, considerable parts of forest area have since been classified as protected area so that these figures have changed. In addition, Nepal has 3.0 million hectares of farmland (21%), and about 1.0 million hectares of uncultivated land (7%).

2. Socioeconomic Dimensions

The population of Nepal reached 25 million in 2008, about 48.5% of which lives in the Terai, 44.2% in the Hills, and 7.3% in the Mountains (CBS, 2005). Population density averages 157.73/km^2, with variations as follows: 330.78/km^2 in the Terai, 167.44/km^2 in the Hills, and 32.62/km^2 in the Mountains. Annual population growth is 2.25%, with the highest in the Terai and the lowest in the High Mountains. Over the past 30 years, this increase in population (twofold in the Terai) resulted in higher demand for forest products while, at the same time, caused the conversion of forest land for agriculture and other land uses. Moreover, unsustainable practices such as shifting cultivation and use of slopes to grow crops

have led to soil erosion and loss of soil productivity (Belbase, 1999).

A three-tiered caste system dominates Nepalese society: dalits (untouchables) janajatis (ethnic groups) and Bramin, Chhetri, Thakuri (higher caste). Dalits represent 13% of the population, are more vulnerable, and have less access to resources than others - a situation which makes a participatory approach to forest management difficult and complex. About 90 % of people reside in rural areas.

The Human Development Report (2008), published by the United Nations Development Programme, ranks Nepal 144th of 182 countries and assigns it a Human Development Index of 0.553. Per capita income is US$260, the lowest in South Asia. Gender disparities are common and women are marginalized in terms of education and access to capital resources.

As noted above, both population pressure and poverty are responsible for deforestation in Nepal and for the scarcity of agriculture land. These problems are forcing people to grow crops in unsuitable areas and to encroach on forest land illegally. When they do so, as landless citizens, political parties often support their action in the hope of winning votes at election time - support which can be construed as a weak commitment to curb forest conversion.

In addition to depending on forest resources for timber, food, medicine and grazing, people rely on them to meet more than 75% of their energy needs and more than 40% of their requirement for fodder (FAO, 2004). Population pressure and poverty have also led to forest degradation and to loss of forest habitat and biodiversity, the magnitude of which is not known due to the absence of baseline data.

3. Strategies to Conserve Forest Biodiversity

Nepal houses rich biodiversity, especially in forests. As signatory to the Convention on Biological Diversity, it is committed to conserving these resources and, in this regard, approved a National Biodiversity Strategy in 2002. The three stated objectives are: preservation of biodiversity, sustainable use of its components, and equitable sharing of benefits derived from genetic resources. A five-year plan (2006-2010) to implement the strategy was prepared, in addition to an interim plan (2007-2010) that attests to the importance of biodiversity conservation in terms of improving livelihoods and balancing the need for a healthy environment with economic development.

As part of efforts to address issues of common concern and achieve global objectives, Nepal is linking biodiversity conservation with other multilateral agreements such as World Heritage Convention, Convention on Conservation of Migratory Species of Wild Animals, Convention on International Trade of Endangered Species of Wild Flora and Fauna, International Tropical Timber Agreement, Ramsar Convention on Wetland Conservation, United Nations Convention to Combat Desertification, United Nations Framework Convention on Climate Change, Kyoto Protocol, World Trade Organization and Trade Related Intellectual Property Rights.

4. Sustainable Forest Management

Since the 1992 Earth Summit, the concept of sustainable forest management (SFM) has evolved to encompass the range of economic, environmental, social and cultural benefits that resources provide - contrary to past practices which focused only on the sustained yield of high value products. Other dimensions include maintaining healthy ecological processes and forest biological diversity.

5. Problems/Issues Related to Sustainable Forest Management

The Department of Forests faces a number of issues related to sustainable forest management and the conservation of biological diversity, as listed below:

- soil erosion, land slides and flooding
- damage to or loss of productivity in agricultural land
- poverty
- unregulated and over grazing
- uncontrolled and recurrent forest fire
- low level of awareness
- forest encroachment
- weak law enforcement
- inappropriate farming practices/shifting cultivation
- conversion of forest land to other uses
- absence of baseline information, inventory and management information systems
- over harvesting of non-timber forest products
- weak forest management
- lack of settlement of bonded labourers and landless people
- poor infrastructure
- limited participation or non consultation with stakeholders
- inconsistencies between government policies and commitments
- inadequate financial resources.

Some of these problems are common across the country, while others are specific to a region. Causes stem from the biophysical aspects of the area; social, economic and cultural conditions; development interventions; and governance.

In order to tackle these problems, it is vital to:

- increase public awareness and education
- share data and information
- build capacity
- strengthen institutions
- promote research and development
- transfer technology
- use indigenous knowledge, skills and practices.

The following government polices and initiatives help to conserve biodiversity through sustainable forest management:

- regulations for the conversion of forest land to other land use
- alternative sources of energy
- Churia conservation strategy and programs
- block forest management
- private/public partnerships
- forest management in high altitudes
- bio-safety and biodiversity registration
- environmental assessment
- forest certification.

6. Institutional and Legal Framework

Since the Department of Forests was established in 1942, it has gone through many reforms. The current structure consists of a central administration, 74 district (provincial) offices, 92 territorial offices and 698 range posts at the grassroots level. In the late 1980s, the government prepared the Master Plan for the Forestry Sector 1988–2010. With 12 programs (Table 2), it remains the government's main policy and strategy for the sector. Highest priority is given to community and private forestry.

Table 2: Master Plan for the Forestry Sector (MPFS) programs

Main programs	Support Programs
Community and private forestry	Policy and legal reforms
National and leaseholds forestry	Institutional reform
Wood-based industries	Human resource development
Medicinal, aromatic plants and other minor products	Research and extension
Soil conservation and watershed management	Forest resource information system and management planning
Conservation of ecosystems and genetic resources	Monitoring and evaluation

Source: HMG/N, 1989

In 1993, the government promulgated a new Forest Act and, in 1995, issued regulations to reflect changes brought about by the master plan. They, along with subsequent amendments, provide the legislative framework for implementation of current policies. The Forest Act divides the national forest into five management regimes: community forests, leasehold forests, religious forests, protected forests and government managed forests. Communities have responsibility over the first three types while government has jurisdiction over the other two (Table 3).

Table 3: Classification and management of national forests

Type	Management Objectives	Responsible Institutions
Government managed	Production of forest goods	Department of Forests / District Forest Offices
Community Forests	Multiple products and services	District Forest Offices / Forest User Groups
Leasehold Forests	Rehabilitation of degraded forests, livelihood improvement, tourism, and wildlife farming	Ministry of Forest and Soil Conservation / District Forest Offices, Leasehold groups
Religious Forests	Conservation of forests around religious sites	Religious institutions, District Forest Offices
Protected Forests	Conservation of forests, wildlife, watersheds, species diversity and environment	Ministry of Forest and Soil Conservation/ Department of Forests / District Forest Offices

Source: HMG/N, 1993

Although the Forest Act empowers government to declare part of the national forest as protected if an area is especially significant for biodiversity conservation or other environmental, scientific or cultural aspects, it has not exercised this option to date. In 2000, the government endorsed revisions to the Forestry Sector Policy which focused on two areas: the involvement of stakeholders in managing the block forest in Terai and the involvement of communities and the private sector in the conservation of ecosystems and genetic resources.

7. Forest Management Models and Programs

The Department of Forests is responsible for the management of forests outside protected areas under two types of models - conventional and participatory.

7.1 Conventional Forest Management

Conventional forest management is the current model used and is based on the mandatory preparation of plans. The aim of this approach is to maximize government revenue through the sale of forest products. Although the Ministry of Forest and Soil Conservation approved operational plans for most districts in the Terai, none were ever fully implemented. However, district forest offices have been preparing strategic plans and forest management plans periodically for five years.

7. 2 Participatory Forest Management

As some of the models highlight below, participatory forest management has proved to be a successful approach.

7.2.1 Collaborative Forest Management

Collaborative forest management originated as a combination of community forestry and traditional government management. The Forest Policy (2000) introduced the concept as a way of involving stakeholders in sustainably managing the block forests of Terai so that these resources could fulfil daily needs, increase government revenue and local incomes, and conserve biodiversity. About 11 management plans under this regime have been approved and implemented so far.

7.2.2 Community Forestry

Community forestry is one of the government's priority programs which has already had a positive impact on resources and on the social and economic status of local people (Kanel, 2001). The program has resulted in more effective watershed management and biodiversity conservation. However, many practitioners are identifying emerging issues related to livelihoods, governance, democratization, social inclusiveness and social justice (Kanel, 2001; Acharya, 2002).

By the end of July 2008, in excess of 1.2 million ha of national forest were handed over to 14,337 community forest user groups, more than 80% of which lies in the Midhills (DoF, 2008). Since the program's inception, many degraded forests in this region have been restored (Barnney and Yadav, 1998). Although community forestry, as provided for in the Forest Act (1993), is silent on biodiversity conservation, forest user groups are actively engaged in protecting both fauna and flora. Progress to date includes:

- registration of 15,000 community forest user groups, with an average size of 105
- 1, 255,000 ha handed over (21% of forest area), with an average size of 80 ha
- benefits to 10,200,000 people in 1,700,000 households (50% of total population)

7.2.3 Leasehold Forestry

Leasehold forestry in Nepal involves contracting part of the national forest for specific

purposes to two groups: enterprises and people living below the poverty line. As a government priority, leasing land to poor households has reduced poverty, rehabilitated degraded forests, and helped to maintain ecological integrity. Progress to date includes

- registration of 5,113 groups
- 23,028 ha handed over
- benefits to 259,200 people in 43,200 households

8. Medicinal and Aromatic Plants

Of the 5,856 species of flowering plants recorded in Nepal, 690 have medicinal properties: 510 wild species, 120 cultivated and naturalised, and 60 exotic (Sharma et al. 2004). About 100 species of medicinal and aromatic plants are traded annually, most of which are exported to India in crude or semi-processed form (ANSAB, 2007). In 2006, the Department of Forests collected about 29 million rupees from the sale of more than 7000 tons of the 20 top ranking species.

Although the collection and trade of these plants is a major source of rural livelihoods, continuous harvests and lack of proper management are threatening the survival of commercially valuable plants, including species in the wild. According to Sharma et al (2004), fifty one medicinal plants are classified as rare, endangered, or vulnerable. In order to address these issues, the government has adopted the Herbs and NTFP Development Policy which highlights the role of local people in the conservation and sustainable utilization of NTFPs through community forestry and leasehold forestry. Officials have identified 30 commercially important plants for research and development and, as table 4 shows, they have prioritised 12 in the context of agro-technology.

Table 4: Medicinal and aromatic plants prioritized for agro-technology (Sharma, 2004)

S.N	Species	Climatic zone
1	Asparagus recemosus	Tropical and sub- tropical
2	Cinnamomum glacescens	Tropical and sub- tropical
3	Dactylorhiza hatagirea	Sub alpine and alpine
4	Nardostachys grandiflora	Subalpine
5	Picrorhiza scruphulariiflora	Sub alpine and alpine
6	Piper longum	Tropical and sub-tropical
7	Rauwolfia serpentine	Tropical and sub-tropical
8	Swertia chirata	Temperate
9	Taxus wallichiana	Temperate
10	Tinospora sinensis	Temperate
11	Valeriana jatamansi	Tropical and sub-tropical
12	Zanthoxylum armatum	Temperate

9. Points to Note

Based on 40 years of practicing community forestry and other participatory approaches to forest management, the following lessons have been learned.

- The participation of local people is essential to achieve SFM.
- Effective participation requires that people feel a sense of ownership in the process.
- Devolution of power to local communities should be incorporated in law and implementation guidelines.
- Measures to enhance the livelihoods of poor people should be integrated into forestry development programs.
- Policy and legislative frameworks must support participation.
- Full devolution to local communities was found not suitable for the management of large blocks of forest and of production forests.
- SFM should focus on meeting subsistence needs and on the optimum utilization of land.

10. Conclusions and Way Forward

Participatory forestry has contributed much in terms of biodiversity conservation and income generation in local communities. Given the pressure on forest resources because of population growth and high levels of poverty, their sustainable management will ensure the wise use of remaining assets. In this regard, practices must incorporate economic, social and environmental dimensions. They should also draw on the indigenous knowledge and social capital of user groups to conserve biodiversity. However, current policy in this area does not reflect reality on the ground and many inconsistencies in policy and legislation are pushing this objective to the side.

In order to make the conservation of forest biodiversity more efficient and cost effective, the following strategies could pave the way:

- apply scientific and multiple use management techniques to balance conservation and development needs
- strengthen participatory forest management and partnership approaches
- involve rural households, community-based organizations, NGOs/INGOs and local institutions
- establish forest fire prevention and control systems at the local level
- raise awareness and support the use of innovative and locally feasible technologies/ equipment to safeguard the forest ecosystem
- involve communities and the private sector in the management of medicinal and aromatic plants, as well as NTFPs, and ensure benefits are shared on an equitable basis

- maintain the integrity of ecosystems by safeguarding ecosystem connectivity and wildlife corridors and by minimizing human-wildlife conflicts
- strengthen coordination among stakeholders
- enhance capacities of individuals and communities.

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Peru Country Report

Dr. Luis Esequiel Campos Baca

1. Introduction

Peru ranks eighth in the world in terms of humid tropical forest area and the second in South America. Natural forest spans 78.8 million ha, 74.2 million of which are in the Amazon, 3.6 million on the coast, and 1.0 million in the Andean region.

The forest sector in Peru, as all other sectors, is undergoing change - the most recent being the creation of the Ministry of Environment (MINAM) under Act N° 1013 which was passed in May 2008. At that time, the Ministry of Agriculture (MINAG) was made responsible for production forests and MINAM was put in charge of conservation areas, natural reserves, and climate change issues. Reforms over the past ten years also include decentralized decision-making, a move which has staff in each department elect regional governments. Responsibility for forest management is shifting as well, from the central to the regional level. However, this process is not yet complete.

In addition to the above scenario, a debate over a new law on forestry and wild life that MINAG has proposed for the approval of Congress is almost paralyzing the forest sector. Another potential major change is the National Plan for Environmental Action which MINAM is developing to use payment for environmental services as a strategy for forest conservation.

The following sections describe Peru's activities in terms of the management of its forest resources in the context of climate change.

1.1 National Program (Long-Term Strategies) for Climate Change Adaptation

Act N° 1013 assigns responsibility to MINAM (General Direction for Policy, Norms and Instruments of Environmental Management, Vice Ministry of Environmental Management) for the elaboration, approval, coordination, supervision, execution and evaluation of the National Plan for Environmental Action (PLANAA) and the National Agenda for Environmental Action. With regard to the former, MINAM is formulating strategies, programs, projects and goals for the period 2010-2021, in collaboration with all organizations belonging to the National System of Environmental Management. The exercise will take into account international conventions and commitments as a framework to develop a national environmental policy and will consider other important dimensions such as advances made in implementing the National Plan for Development, regional environmental policies, and regional and local environmental actions plans. As part of its role, MINAM should also help regional and local governments to elaborate their own environmental plans.

1.2 Implementation of Climate Change Adaptation

In response to the vulnerability of Peru's Andes region to climate change, the Swiss Agency for Development and Cooperation is collaborating with the Ministry of Environment to implement Programa de Adaptación al Cambio Climático (PACC) as a means to assist the Cusco and Apurimac regions to adapt. Intercooperation is leading efforts, supported by scientific institutions in Peru and a Swiss consortium which is headed by the University of Zurich. This consortium includes Meteoswiss, Meteodat, Agroscope Reckenholz-Tänikon ART, the Swiss Federal Institute for Forest, Snow and Landscape Research, WSL-SLF, and the University of Geneva. Assistance takes the form of data analysis, development of climate models and scenarios, climate impact and vulnerability assessments, climate change monitoring and information systems, and academic courses.

The programme focuses on three themes which are cross-sectoral in scope: water resources, food security, and natural disasters. Human aspects are integrated into all dimensions to allow for a more complete view on vulnerabilities to climate change. The interdisciplinary nature and the many players involved in PACC represent both its strength and its complexity. It provides a major opportunity to improve the dialogue between scientists, implementing agencies, and politicians to find sustainable mechanisms for climate change adaptation.

1.3 Forests and Climate Change, and Methodologies to Reduce Carbon Dioxide Emissions

Various projects are running in Peru to study the role of forest in reducing carbon dioxide emissions.

- Carbon accounting: methods, scales of analyses, ecosystem approach
- Modelling vulnerability and deforestation
- Biodiversity and genetic resources as an strategy for adaptation
- Biological indicators of climatic change
- Tropical forest biomass evaluation
- Dendrochronology in dry Amazonian forest.

In November 2010, following a national public forum on the environment, the government outlined Peru's plan to reduce carbon dioxide (CO^2) emissions. It noted that implementation requires US$2.7 billion to cut levels by 12.5Mt per year by 2020. (Ecodialogo 99, CONAM). Activities include replacing diesel and coal energy with liquid propane gas (LPG), hydroelectric power, wind-driven turbines and solar panels. Transport options include awarding bonuses for withdrawing old public transport vehicles from circulation, converting taxis to LPG, technical inspections, and the construction of bicycle lanes. The plan also calls for sustainable forest development.

Government estimates that, from 1994 to 2020, CO^2 emissions will rise in the energy sector from 23% to 37%, in industrial processing from 10% to 18% and in waste from 3% to 4%. Over the same period, emissions in agriculture are expected to drop from 23% to 19% and in soil use from 41% to 22%.

1.4 Combating Desertification

Traditions dating back to 10,000 B.C. have governed the management of arid ecosystems on the coast and the semi-arid mountainous systems of the Sierra. Techniques exist for irrigation (e.g., old irrigation channels), farming (e.g., polycultures adapted to arid conditions), stockbreeding, and forest exploitation. More contemporary approaches are taken to conserve soil on slopes and to protect biological diversity in the higher parts of the Sierra where a great variety of species are found. The application of this knowledge is paramount in terms of nutrition, not only at the local, regional and national levels, but also on a global scale because products such as tomatoes, potatoes, beans and many fruit trees (papayas, custard apples, avocados) are important to all mankind.

Even though these techniques are still well known, they are not widely practiced in situ,

especially on the coast where "modern" techniques (e.g., monocultures, pesticides) have gained acceptance, most of which are unfit for the specific characteristic of these ecosystems and are accelerating desertification.

If we accept that research and projects (despite certain limitations) have helped to fight desertification, we must also recognize that a critical component in the successful implementation of all activities in this region is COORDINATION. Key stakeholders in both rural and urban areas, in different segments of society, must reach consensus in order to begin a new phase of dialogue with nature on questions such as the utilization of natural resources and their relationship with the environment. If this objective were achieved, it would lead to the integrated management of hydrographic basins created in natural spaces.

Large-scale projects are needed to achieve the following objectives and activities:

- The management of natural resources and the environment based on well-defined units with natural criteria (BASINS, especially in the Sierra): improve the management of water, soil and plant resources as well as the structure and organization of agricultural and forest activities through, for example, establishment of irrigation committees and autonomous bodies.

- The use and conservation of the dry and low mountainous forests as part of efforts to strike a dynamic balance within the environment in terms of climate, soil, biological diversity, and other aspects: make productive activities more compatible with ligneous vegetation.

- Agriculture and stockbreeding based on ligneous species (brush or trees) on the coast and the Sierra: promote agro-forestry or agro-forest-pasture systems.

- City planning according to the environmental features of the zone, e.g., aridity: forbid the conversion of agricultural land into urban areas, mount extensive campaigns to save water, use species to plant gardens in arid areas that have adapted to hydrologic stress (e.g., papejillo, pasayo, ceiba, and jacaranda).

- Maximum recycling of waste in urban centers: institute a process to separate waste and recycle sewage water.

- Inclusion of desertification in the regional education system: teach ways to coexist with El Niño, the ecology of arid zones, and the historical relationship between humans and these ecosystems – 10,000 years).

- Campaigns to prevent and coexist with El Niño, with support from the mass media, schools and other educational institutions: raise awareness about ways to reap maximum benefit from El Niño's blessings.

- Research: with the use of geographic information systems, have institutions (universities and NGOs) concerned with natural resources study the environmental impact of the main productive activities in Piura and produce a forest map and a soil map to arrive at a more precise diagnosis of the state of the environment and level of desertification in the region.

- Elaboration and maintenance of a system to monitor the environmental situation in Piura, especially desertification, in coordination with institutions that carry out periodic

observations such as meteorological stations, universities, SENAMHI and special projects (Chira-Piura), Civil Defense, NGOs, and local government.

1.5 Main Obstacles to Sustainable Forest Management

Despite Peru's movement towards sustainable forest management, Conservation International identified two main obstacles which hinder the achievement of this objective:

- the short sighted vision of Peruvian entrepreneurs who invest small sums in SFM and want immediate returns
- weak governmental capacity to monitor the activities of entrepreneurs and to sanction those who do not comply to regulations for the management of forest concessions, especially the development of operational plans which should detail the characteristics of the forest and provide information on the assessment, harvesting, regeneration, protection and control of resources so as to ensure the conservation of biodiversity and the environment.

1.6 Biodiversity Enhancement Plan

Scientists estimate that Peru is home to some 25,000 plant species (10% of the world total) and 1,816 bird species. It is considered one of the world's richest in terms of natural ecosystems, species, genetic resources and indigenous cultures and was among the first countries in Latin America to establish local government strategies to curb the loss of biological diversity. However, since plans were developed in 1999, capacity to implement is weak.

Peru's territory runs from the Pacific coast, to the Andean mountains and the Amazon forest. It has 84 of the world's 104 "life zones" and a surprising diversity of both human and biological resources. Because of its vast genetic wealth, it is said that saving Peru would provide the basis for rehabilitating the rest of the world. But the extraction of natural resources in recent decades is threatening the country's great natural heritage and hundreds of species are in danger of extinction.

Manuel Ruiz, Director of International Affairs for the Peruvian Society of Environmental Law (SPDA), states that, in addition to the expansion of farming, small-scale mining, oil drilling and logging in the Amazon have intensified. He also notes that, although Peru has signed nearly all the international instruments for protecting biodiversity, government has failed in practice because it has not established systems to monitor the enforcement of regulatory frameworks. He further maintains that promoting private investment does not conflict with efforts to protect biodiversity. Rather, the problem is weak institutions. According to the study "Oil and Gas Projects in the Western Amazon: Threats to Wilderness, Biodiversity and Indigenous Peoples", published online in 2008 by the scientific journal PLoS One, extraction of fossil fuels is planned to take place over 72% of the Peruvian Amazon.

Between 2002 and 2007, mining concessions grew more than 70% due to incentives to attract foreign investment and the high price of metals in international markets. Indigenous and peasant communities have increased their protests over mining-based pollution and the government has expressed concern over mining operations in the eastern jungle region of Madre de Dios where 150,000 hectares of forest have been destroyed and an estimated 32

tons of mercury were dumped into the environment, according to official figures. As a result, officials established a two-year moratorium on new resource exploitation in the area.

In 2009, the former head of the National Institute of Natural Resources, José Luis Camino, reported that regional administrators granted 4,200 timber permits to local communities but that tons of cedar and mahogany had been sold abroad. Biological Diversity Chief Del Río admitted in an interview with Tierramérica that certain economic activities in the Amazon were giving rise to problems but that the creation of the National System of Protected Natural Areas to oversee such activities was a historical step in the right direction. She further noted that regional strategies are being implemented in the northern departments of Loreto and San Martí, which, this year, issued ordinances to reduce the loss of natural wealth. The other five regions that have designed, but not yet implemented, strategies are Ucayali, in the east; Amazonas, Cajamarca and Tumbes, in the north and northwest; and Junín, in south-central Peru. Del Río also pointed out that the Biodiversity Department of the Environment Ministry is working on a study to show how profitable the preservation of the country's natural heritage can be.

Peru's 60 protected areas cover some 20 million hectares, or nearly 15% of the national territory. The government needs to make protection of those areas a top priority and consolidate "bio-business" in order to make the most out of the country's natural resources.

World leaders committed to cut biodiversity losses by 2010 - a goal now widely seen as unattainable. However, the International Union for the Conservation of Nature (IUCN) is coordinating Countdown 2010 to push for progress and mobilize governments, business and civil society to increase efforts on this front.

The IUCN's Red List (2008) registered more than 16,900 species in danger of extinction.

Departamento	Superficie del departamento (ha)	Superficie de bosque amazónico original (ha)	Superficie de bosque amazónico remanente al 2000 (ha)	Departamento Superficie deforestada (ha)	Contribución a la deforestación total de la amazonia (%)	Pérdida de bosque con respecto al bosque original (%)
AMAZONAS	3,924,913	3,660,824	2,659,357	1,001,540	8	27.36
HUANUCO	3,772,224	2,324,627	1,724,007	600,654	5	25.84
LORETO	36,885,195	36,299,852	36,001,221	945,642	7	2.6
MADRE DE DIOS	8,518,263	8,419,180	8,215,301	8,215,301	65	2.42
SAN MARTIN	5,125,331	4,861,264	3,533,569	1327736.15	10	27.31
UCAYALI	10,241,055	10,110,075	8,768,918	627096.73	5	6.2
Total	68,466,981	65,675,822	60,902,373	12717969.88	100	

Forest Restoration in the Philippines

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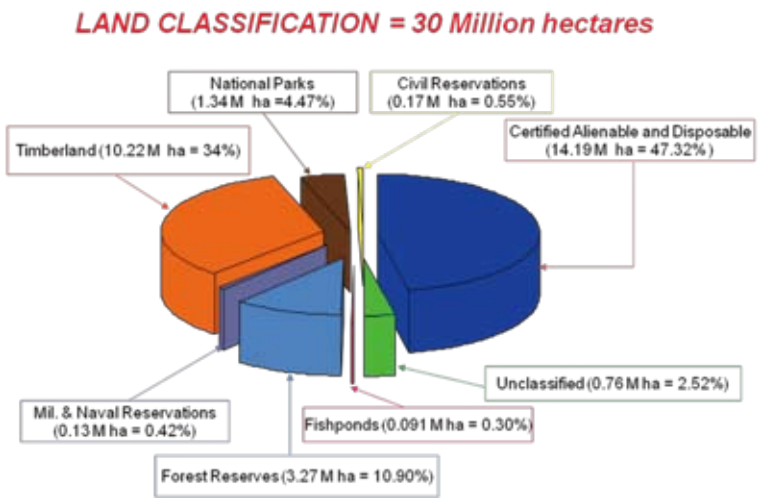
1. Introduction

The Philippines is an archipelago of 7107 islands which spans a land area of around 30 million hectares (Figure 1). About 755,000 hectares are still unclassified forestland, the use of which has not been determined (FMB 2008). In terms of forest cover, Philippines is estimated to have 7.168 million hectares or 24.27% of the country's land area. Of this amount, 56.24% is open forest, 35.71% closed forest, 4.60% plantation forest and 3.45% natural mangrove forest (FMB 2008). The country is divided into 17 political regions, sub-divided into 79 provinces, 115 cities, 1499 municipalities and 41,969 barangays (Annex 1).

Figure 1 Land classification and cover



Source: 2008 Philippine Forestry Statistics

Due to heavy logging, upland migration and agricultural expansion, the country's once lush tropical rain forests have disappeared or have been degraded over the last century, as was the case elsewhere in the region. As a result, the Philippines heavily relies on imports to meet much of its domestic demand. Deforestation is often considered the cause of flooding and landslides which occur almost annually. Thus, the government is taking extra care to review applications before granting harvesting permits and is implementing forest protection measures. As a matter of priority, it is also undertaking a massive reforestation program, assisted natural regeneration (ANR), plantation establishment, and agroforestry.

The country's many initiatives to rehabilitate degraded forest land have evolved over almost a century, in response to changing socio-economic, environmental and political realities. Their aim is to restore environmental services, supply timber and improve livelihoods of people living in and near forests. They vary in scale, objectives, stakeholders, funding sources and institutional arrangements. Until international support began in the mid 1970s, government and private companies carried out forest restoration activities. Since that time, projects vary widely in terms of participation, scale, objectives, approaches and duration - for example, from large government reforestation of watersheds to small plantation establishment by non-government organizations (NGOs), local government units (LGUs), and peoples' organizations (POs).

In 2008, the Department of Environment and Natural Resources (DENR) and non-government entities reforested 43,609 hectares of denuded area - 27,752 hectares (64%) and 15,857 hectares (36%) respectively. The DENR attributes the increase in forest cover to a moratorium on commercial logging in several provinces, a shift in logging from old-growth to residual forests, log and lumber export bans, and accelerated public and private reforestation efforts (Defensor 2004). The increase in forest cover is also attributed to the regrowth of vegetation, the establishment of plantations, an increase in agroforestry, and spontaneous tree planting by farmers and others. In addition, as early as the 1990s, timber license agreements (TLAs) of many non performers were not renewed when they expired. Instead, Industrial and Socialized Industrial Forest Management Agreements (IFMA and SIFMA) were expanded to cover most areas where TLAs had expired. In 1995, Executive Order No. 263 made community-based forest management (CBFM) the national strategy for managing the country's forest lands. These policy shifts and initiatives are also believed to have contributed to increasing forest cover.

2. Forest Restoration in the Philippines

2.1 Community-Based Forest Management

According to Executive Order No. 263 and its associated rules and regulations, the objectives of CBFM are to 1) protect and advance the rights of the Filipino people to a healthy environment; 2) improve socio-economic conditions through social justice, and the sustainable development of and equitable access to forestland resources; and 3) respect the rights of indigenous peoples to their ancestral domains by taking into account their customs, traditions and beliefs in the formulation of laws and policies.

To achieve these objectives, Administrative Order No. 96-29 of the Department of Environment and Natural Resources integrated and unified all the people-oriented programs of the government, including the Integrated Social Forestry Program; Upland Development Project; Forest Land Management Program; Community Forestry Program; Low Income Upland Communities Project; Regional Resources Management Project; Integrated Rainforest Management Project; Forestry Sector Project; Coastal Environmental Program; and Recognition of Ancestral Domains/Claims.

At least three major stakeholders are involved in the implementation of CBFM: local communities or people's organizations (POs), the Department of Environment and Natural Resources, and local government units (LGUs).

2.1.1 People's organizations

As the major stakeholder, POs are entitled to a number of incentives and privileges, as stipulated in the Community-Based Forest Management Agreement (CBFMA) which serves as a land tenure instrument issued by DENR. Foremost are the rights to occupy, possess, utilize and develop the forest lands and resources in a designated area and claim ownership to improvements made. Other privileges include exemption from paying land rent and the right to be properly informed and consulted on all government projects implemented in

the area. In return, POs have the responsibility to plan, implement, monitor and evaluate all activities contained in the Community-Based Forest Management Framework and Five-Year Work Plan. Specifically, POs are expected to protect, rehabilitate and conserve the natural resources in the CBFM designated area and assist government to protect adjacent forest lands. Governments should arrange for the equitable sharing of benefits, ensure financial transactions are transparent, and promote participatory management and consensus building in all CBFM activities.

2.1.2 Department of Environment and Natural Resources

DENR is responsible for the management, development and administration of the country's forestlands and resources. In this regard, the Secretary of DENR issues Administrative Orders, Memorandum Circulars and related regulations that guide the implementation of CBFM. In partnership with POs and LGUs, DENR oversees the four-stage process related to this approach: the preparatory phase, diagnosis, planning, and implementation. The main tasks of field offices at the regional, provincial and community levels are to manage, monitor and evaluate the program.

In addition, DENR is the only agency that can legally grant land tenure in classified forest lands. Under CBFM, two types of instruments are issued: a Community-Based Forest Management Agreement (CBFMA) and a Certificate of Stewardship Contract (CSC). The former is between government and the People's Organization - as forest manager - on behalf of the local community. Duration is 25 years, renewable for another 25. The latter is between government and individuals or families which occupy or till portions of forest lands covered by a CBFMA.

2.1.3 Local Government Units

Local Government Units became involved in CBFM when Republic Act 7160, otherwise known as the Local Government Code of 1991 (LGC of 1991), was passed. Among other functions, the LGC of 1991 tasked these units with the implementation of CBFM projects, particularly Integrated Social Forestry. Since that time, they have been including forest management and protection in the formulation of local ordinances and policies in consideration and consultation with DENR policies (Pulhin 2004). The Department of Interior and Local Government (DILG) subsequently issued three circulars between 1995 and 1996, pledging support to forest devolution. In addition, DILG and DENR jointly issued two circulars in 1998 and 2003 to strengthen implementation efforts. To date, the provincial governments of Nueva Vizcaya in Northern Luzon and Bukidnon in Mindanao passed resolutions to appropriate funds to finance CBFM projects in their localities.

Box 1 describes forest restoration in Dupax del Sur, Nueva Vizcaya Province, by the Banila Community Based Cooperative.

Box 1 Banila Community-Based Cooperative

In 1993, before the Banila CBFM project was established, the residents of Barangay Banila, Dupax del Sur formed an organization to rehabilitate and develop the degraded forestland in their community. A year later, the group began raising seedlings and reforested around 180 hectares under the system of bayanihan, using their own resources. Despite the difficulty to secure outside funding, they were able to manage, partly because of their committed leader, Mr. Isaac Liquigan, who even sold his carabao to help finance the project. In 1995, staff of the Asian Development Bank (ADB) visited the community and were impressed with its accomplishments. The ADB subsequently loaned the association PhP3.9 million to reforest 220 hectares under the Banila Contract Reforestation Project, a task which it completed within 3 years. The organization has since evolved into the Banila Community-Based Cooperative and is now engaged in managing not only the 220 ha but, as of December 2003, the entire forestlands of the community which amount to 2,395 ha.

Because of the Cooperative's exemplary performance, it attracted more funding from ADB, the Comprehensive Agrarian Reform Program of DENR, and JICA to plant trees on 366.0 hectares. As of 2009, it also planted fruit bearing and other types of trees on 48 additional ha and plans to extend its forest plantation using a combination of indigenous and exotic species, specifically dipterocarp mixed with gmelina. This particular project will be financed with profits from harvesting an expected 168 m^3 of gmelina for which DENR granted a Resource Use Permit - the only upland organization in Region 2 to have been issued one. Some members of the Cooperative also patrol the CBFM area on a voluntary basis, both day and night.

Through the commitment and personal sacrifice of the residents of Banila, large tracks of degraded forests have been restored and are being protected against fire and illegal activities, including squatting. With technical assistance from various agencies and a strong partnership with DENR and LGUs, the Cooperative has achieved significant results, winning numerous prestigious awards: best Cooperative in Dupax del Sur in 2002, most outstanding ADB loan project in the province of Nueva Vizcaya, and model sustainable development project in the upland category in Nueva Vizcaya and Region 2 for 3 consecutive years (2000-2001) - a feat which earned them the Hall of Fame Award in 2003.

2.2 Development of local tropical resources to sustain livelihoods

In response to Agenda 21 after the Earth Summit, the Philippines developed its own Agenda 21 as the framework for sustainable development. In this regard, it promotes the participation of local communities in natural resources management and provides equitable access to productive resources and services, both of which are essential components of the CBFM strategy. A project entitled "Developing the Tropical Forest Through Community-Based Management" was implemented in Buenavista, Bayombong, Nueva Vizcaya. It covers around 3,000 hectares of natural and secondary dipterocarp forest, mixed plantation forests, regenerated forest area, grasslands for cattle raising/fattening and agro-forestry farms.

Prior to the project, almost half the area suffered from illegal activities, including timber theft, and from the damaging effects of over-grazing and shifting cultivation. In addition, migration increased the number and cultural diversity of settlers; the community was fragmented; and tenure and access rights in the project area were not secure. Since implementation, however, tenured instruments have been put in place and plantations were established. Management of the regenerated and mature natural forest use scientifically validated methods and appropriate silvicultural treatments. With support from DENR and LGUs, local communities were trained and organized into enlightened groups which developed and ran community-based sustainable forestry and agro-forestry enterprises that produce furniture from timber and rattan, handicraft from thinning and furniture wastes, fossilized flowers from leaves and grasses, brooms from grasses, and fruit.

2.3 Indigenous knowledge (Muyong System of Ifugao)

In addition to the formal arrangements that characterize government-initiated CBFM projects, independent CBFM arrangements also exist. One notable example is the traditional muyong system of land ownership and forest management, unique to the Tuali tribe in Ifugao Province in the Cordillera Region of the island of Luzon, to protect watershed areas in the Northern Philippines. The term muyong means forest, most of which are located in the upper portion of the stratified agricultural lot and are generally thought of as an extension of the payoh (rice field). The forested areas help to conserve water for the payoh and serve as a source of firewood for cooking and raw materials for house construction and wood carving.

The Ifugao customary laws confine the practice of muyong to clan members given that the system is considered to be clan or family-owned. To users, it is a disgrace to pass the muyong to their heirs if only a few trees remain on the land. Maintenance includes weeding, thinning or release cutting, enrichment planting, and stem bending. They also employ sprouting/pruning, rejuvenation, compost piling, root cutting, and collapsing. Huge trees in a muyong, especially near creeks and large rocks, are not cut because they are believed to be the homes of the Ifugao earth spirits (IRDC 1996). To date, most remaining forests in the Ifugao and Banaue areas are managed under the muyong system.

In view of its success in forest conservation, protection and utilization within the Ifugao's traditional watershed areas, DENR and the National Commission of Indigenous Peoples (NCIP) issued Joint Administrative Order No. 2008-01 in July 2008 to help DENR, NCIP and LGUs to recognize, document, register and confirm sustainable forest management systems and practices of the indigenous people. The order also aims to enhance current knowledge of their monitoring systems, penalties and sanctions which are applied under customary laws governing traditional management units and community/clan-owned woodlots.

2.4 Watershed Restoration by Local Government Units

As noted earlier, the Local Government Code (1991) requires that local governments be consulted with regard to development within their jurisdiction, including mining operations, that they are in charge of managing all natural resources, and that they actively participate in all matters related to the environment, consistent with the devolution of power to line agencies (Box 2). However, these added responsibilities entail the need for more financial, technical and human resources which the LGUs find difficult to mobilize.

Box 2. Management of Barobbob Watershed

Recognizing that local government units perform valuable functions, DENR devolved the management of Barobbob watershed to the LGU of Nueva Vizcaya. With its concurrence, the provincial government entered into a Land Management Agreement (LMA), initially for 25 years, with individual members of the community which then formed an association and registered it. The agreement included provisions to implement the Strategic Watershed Management Plan which was formulated during a series of participatory workshops and exercises to build organizational skills, prior to the LMA.

In July 1999, barely a year after signing the agreement, Barobbob won the "GALING POOK AWARD" as the first LGU-managed watershed. It is also the first time watershed management was fully devolved to a province. The area comprises 439.0 hectares and was chosen due to a significant reduction in forest fires which used to be frequent. By preventing these occurrences, the forest is now regenerating naturally. An aggressive year-long program raised public awareness and concern for forest protection and renewal, triggering massive tree planting by small landholders, NGOs, POs and even former kaingeros - an activity which gained in popularity as a result of incentives which the LGU offered in the form of unique harvesting rights. Other factors which led to successful watershed management in Barobbob include turning 120 squatters into land managers who guard the perimeter of the area; an annual budget to provide technical and material assistance as well as protection services; formal agreements which gave secure tenure rights to individual farmers; and the development of management plans for both individual farms and the watershed itself. As a result of these innovations, forest restoration in the Barobbob watershed became a reality.

The LGU has empowered the association to manage the watershed and is building its capacity to do so on its own. To show support for the program, farmers using the water for irrigation are paying a user fee which then goes toward funding more restoration. The scheme has become the object of visits from other LGUs and international agencies. Reaction from former squatters whenever they are interviewed by outsiders is consistent and always positive. Before, they hid in fear from DENR forest guards but, today, they openly earn their livelihood with pride and are replanting. They believe their future and the restoration of the ecological balance are interdependent.

One young person recounted that whenever he and others walked through the watershed, they would hack shrubs with their bolos out of habit but they no longer do so in case they hurt the saplings. Now, whenever they see a young tree, they clear the weeds around it so it can grow.

With assistance from various organizations, the Barobbob watershed project planted the perimeter of 11.0 hectares with exotic and indigenous tree species such as gmelina, ipil-ipil, narra; rehabilitated 5.0 hectares of grassland; planted 7.0 km of bamboo and rattan (lituko) along creeks and gullies; established 0.4 ha of Phil. teak, in collaboration with Nueva Vizcaya State University; constructed 6.0 km of access trails; trained in agriculture on slopes; and gave seminars on solid waste disposal, composting, and the production of bamboo and mushrooms. Individual holders of a Memorandum of Agreement planted forest trees along the boundary of their farm lots and crop trees in the middle of their land.

2.5 Mining Forest Program

Republic Act No. 7942, Philippine Mining Act of 1995 (Section 2) declared that the State owns all mineral resources on public and private lands within the territory and exclusive economic zone of the Republic of the Philippines. It further stipulates that the State is responsible for their rational exploration, development, utilization and conservation, in collaboration with the private sector in order to enhance national growth in a way that safeguards the environment and protects the rights of communities. In support, the DENR issued Administrative Order No. 62 (October 1998), in addition to regulations and guidelines for the implementation of the "Adopt-a-Mountain, Adopt-a-Mining Forest" Program. In October 2005, the National Executive Committee passed Resolution No. 2005-02 to rename and make the "Mining Forest Program" separate and distinct from the "Adopt-a-Mountain Program".

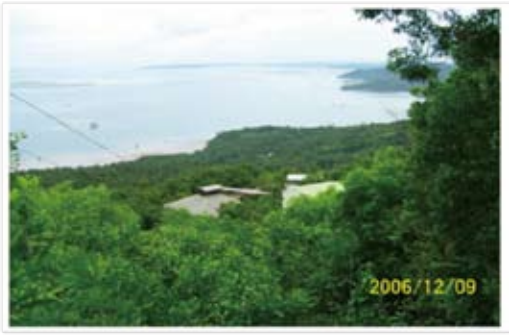
The Mines and Geosciences Bureau (MGB) of DENR launched the Mining Forest Program as a means to identify Filipino mining companies that conduct business in a socially responsible manner and to encourage them to intensify forest rehabilitation and restoration. DENR also introduced the "Best Mining Forest" award which it confers during the Annual Mine Safety and Environmental Conference. Companies are judged according to their development plan, nursery operations, extent of plated area, maintenance, protection, and other environmental considerations, and the migration of fauna and wildlife.

As of 2008, the program produced 9,244,893 seedlings and planted/rehabilitated 10,319 hectares through reforestation, agroforestry, and assisted natural regeneration. Among the areas restored are mined-out areas, slopes, decommissioned tailings ponds, old access roads, causeways, waste dumps, and vacant lots. The species planted are mostly indigenous: *Pterocarpus indicus, Vitex parviflora, Casuarina equisetifolia, Swietenia macrophylla, Gmelina arborea, Pinus insularisi, Alstonia macrophylla, Pinus merkusii, Xanthostemon verdugonianus, Shorea negrosensis, Shorea contorta, Eucalyptus deglupta, Polyscias nodosa, Artocarpus blancoi, Acacia auriculiformis, Acacia mangium,* species of mangrove, bamboo and rattan, and fruit-bearing trees.

Philex Gold Philippines,Inc.-Sibutad,Zamboanga del Sur

PIntation Establishment

Before



After

Before

After

3. Conclusion

The Philippines has used several institutional and technical approaches in its attempts to restore forest cover, provide environmental services, supply timber and, more recently, improve local livelihoods. Because outcomes and impacts remain unclear and because logging and population pressure continue to degrade forests and forest lands, the common perception is that efforts largely failed.

Since forest restoration began as early as 1910, cover has increased around 0.7 million hectares as a result of concerted interventions from government, the private sector, people's organizations/forest communities, and donor agencies (Annex 4). Currently, the most promising approach to address the underlying causes of degradation appears to be the empowerment of communities and farmers to rehabilitate and manage the forest lands, with strong support from government and nongovernment agencies, and allow them to directly benefit from their efforts.

4. Recommendations for Successful Forest Restoration in the Philippines (Adopted from CIFOR's report: One Century of Forest Rehabilitation in

the Philippines - Approaches, Outcomes and Lessons)

4.1 For Policy Makers and Legislators

- Provide a stable environment for sustainable forest rehabilitation and management by amending legislation to recognize and secure tenure holders' rights and responsibilities and developing sound harvesting policies. The legislation should draw on the latest scientific information and be drafted through public consultations which are facilitated by professionals.

- Involve communities as partners in forest rehabilitation and management and incorporate such participation into the legislation.

- Define and incorporate into the legislation the roles of various actors in forest rehabilitation. Entrust commercial forest rehabilitation and management to communities, farmers and the private sector, with support from government and NGOs on a long-term basis. Government and NGOs should focus on rehabilitating and managing conservation areas for environmental services and biodiversity but should involve communities in these efforts and ensure they benefit.

- Acknowledge and incorporate into the legislation the production and income generation functions of forests. Provide adequate incentives for communities, farmers and the private sector to rehabilitate degraded forest lands for viable commercial production by offering credit facilities, tax and fee reductions, technical assistance, marketing support, longer tenure, import regulations that favor local tree growers and provisions that encourage forest industries to obtain timber from rehabilitated areas.

- Develop clear and consistent legislation for timber harvesting and other resource use on lands which are governed under various arrangements such as timberlands, watersheds, protected areas, and those that are subject to industrial, socialized industrial, and community-based forest management agreements. Simplify policies and bureaucratic requirements to avoid confusion, misinterpretation and abuse, foster effective management and ensure compliance.

- Allocate an adequate annual budget for government to support rehabilitation and management by local people and the private sector, as well as to administer conservation areas. Avoid accepting any more large forestry loans because they are unsustainable. Explore alternative finance mechanisms such as the Clean Development Mechanism.

- Generate new jobs and income-generating options in the lowlands to avoid further mass migration to the uplands for economic reasons.

4.2 For DENR and Other Government Agencies

- Avoid setting up independent rehabilitation projects for production because they have little chance of success. Instead, provide technical, marketing, management and financial support to POs, farmers and the private sector. Build their capacity and empower them to sustainably rehabilitate and manage the forest lands, derive benefits, and generate/raise funds required. Increase the number of extension workers and ensure the transfer of knowledge when there is a change in DENR staff.

- Allocate remaining open-access lands to farmers, communities and the private sector, and provide secure tenure and income-generating options. Retain only priority conservation areas under direct government administration.
- Improve road and transport systems, and help to market products from rehabilitated areas. Support the development of market associations, information systems and other marketing tools.
- Support and encourage private sector-community partnerships such as out-grower schemes or joint management with profit-sharing.
- Design rehabilitation projects for biodiversity and watershed conservation in protected areas and reservations by, for example, establishing complex forests of mixed species and strata. Engage communities in managing these areas and allow them to benefit from fruits, other non-timber forest products (NTFPs) and livelihood schemes, if not from timber. Set up long term management plans and provide staff and financial resources to administer these areas.
- Develop quality planting material of different species and establish regional seed centers and nurseries, with support from academic and research institutes.
- Monitor and evaluate the physical, environmental and socio-economic outcomes of rehabilitation, in collaboration with academic and research institutions, to ensure that initiatives meet objectives, reduce undesirable impacts and enable adaptive management.
- Use remote sensing and geographic information systems to assess changes in forest cover from rehabilitation efforts and natural regeneration. Develop and maintain a database of rehabilitation initiatives, including their progress, and establish a user-friendly management information system to facilitate decision-making based on science.
- Strengthen forestry law enforcement. Penalize only individual violators and those who condone illegal activities. Acknowledge those who fulfill their responsibilities and abide by the rules.
- Integrate forest rehabilitation within DENR and across sectors, including into land use and development plans of LGUs to ensure sustainability after project support ends.
- Given limited resources and the need for income generation to be successful, prioritize rehabilitation in forest-poor areas where there is demand for forest products and where the chances of success are good.

4.3 For Non Government Organizations (NGOs)

- Avoid setting up independent rehabilitation projects with a pure conservation goal because they have little chance of success. Instead, provide technical, marketing, management and financial support to POs and farmers, and help them develop viable livelihood schemes. Build their capacity and empower them to sustainably rehabilitate and manage the forest lands, derive benefits and generate/raise the funds required. Strengthen community associations to be able to negotiate successfully and safeguard community interests in the face of disruptive policy changes and other events.

- Help design, implement, and monitor and evaluate rehabilitation projects which benefit biodiversity and livelihoods.
- Acknowledge and support the production and income generation functions of forests so that rehabilitation is successful and sustained. Not all logging is destructive and forests can be sustainably managed for various goods and services. Violations by some should not lead to total logging bans, a move which harms law-abiding people as well.
- Recognize that, on a small scale, forests can affect peak river flows and floods but their effects on major floods and landslides over a large basin are relatively small. Lobbying politicians to stop all logging because of perceived links with flooding could destroy livelihoods and incentives to grow trees, along with the environmental benefits they bring.
- Lobby for community/farmer upland rehabilitation and management for multiple benefits as the only model that can succeed in the populated uplands because it provides access to resources and income to poor communities.

4.4 For Local Government Units (LGUs)

- Support community/farmer upland rehabilitation and management for multiple benefits in areas without timber harvesting restrictions instead of implementing independent projects. Where such restrictions exist, such as in watersheds, ensure communities participate and benefits from NTFPs and other livelihood schemes.
- Support self-sustaining and low-cost initiatives at the local level that generate revenue while providing environmental services and supporting local livelihoods.
- Establish Environment and Natural Resources Officers as focal points in LGUs to support projects on a continuous basis, even when politicians and staff in the administration change.
- Improve roads and transport, and support the marketing of products from rehabilitated areas.
- Integrate forest rehabilitation into land use and development plans of LGUs to ensure sustainability after project support ends.

4.5 For POs and Farmer Groups (with support from other agencies)

- Match species to sites, use appropriate silvicultural techniques, and use mixed species to reduce pest and market risks. Incorporate fruits and other NTFPs to diversify and get short-term income.
- Promote collective action, learning and information exchange among community members and other stakeholders in the area to build local capacity to rehabilitate and sustainably manage the areas.
- Generate income through sale of forest products or other livelihood schemes, and reinvest in the area to make it self-sustaining.
- Explore the markets, develop marketing strategies and plant marketable species. Develop

marketing associations and community-based market information systems. Add value to products.

- Explore private sector-community partnerships in timber production and marketing.
- Avoid abuses and violations that will lead to policy constraints that punish the entire sector.
- Strengthen negotiation skills of community organizations and network with other communities and agencies to safeguard common interests.

4.6 For Private Sector

- Match species to sites, use appropriate silvicultural techniques, and use mixed species to reduce pest and market risks.
- Develop marketing strategies and plant marketable species. Develop marketing associations and market information systems. Add value to products and analyze the costs and benefits of introducing certification schemes.
- Develop partnerships and share responsibilities and benefits with local communities to avoid failure and fulfill social responsibilities.
- Avoid abuses and violations that will lead to policy constraints that punish the entire sector.

4.7 For Donors and Development Agencies

- Support participatory rehabilitation projects which benefit communities and farmers. They should cost little to replicate and be self-sustaining, unlike those of the past.
- Extend the duration of projects for sustained impact. Help to build the capacity of local institutions to continue activities once projects end and ensure sustainability through income generation and reinvestment.
- Design projects to meet specific objectives such as improving livelihoods or water quality and consider all relevant technical and socio-economic issues.
- Support the development of market information systems and other marketing support tools.
- Include participatory action, research and evaluation of environmental and socio-economic impacts in the design and implementation of projects, including forest rehabilitation.
- Support policy reform processes related to forest rehabilitation such as the pending legislation on sustainable forest management.

4.8 For Academic and Research Institutions

- Train government agencies (LGUs and DENR field staff), NGOs, POs and the private sector to design rehabilitation projects based on specific objectives such as biodiversity

conservation or arresting soil erosion. They should also be trained in matching species with sites, silvicultural techniques, participatory methods, sustainable management, production, marketing, organization and finance.

- Incorporate the range of rehabilitation issues into university curricula and produce professionals who can provide technical assistance to project implementers and support agencies.
- Research participatory aspects of forest management and conduct technical evaluations of environmental and socio-economic impacts of rehabilitation (project-based and spontaneous) and disseminate the information widely.
- Use remote sensing and GIS to assess changes in forest cover as a result of rehabilitation efforts and tree planting.
- Provide empirical information based on research and engage in discussions on policy development and reform.
- Disseminate scientific findings and engage in a dialogue with NGOs and civil society to help them understand that timber harvesting is an integral part of sustainable forest management, as are plantation establishment, maintenance, protection, and income generation.

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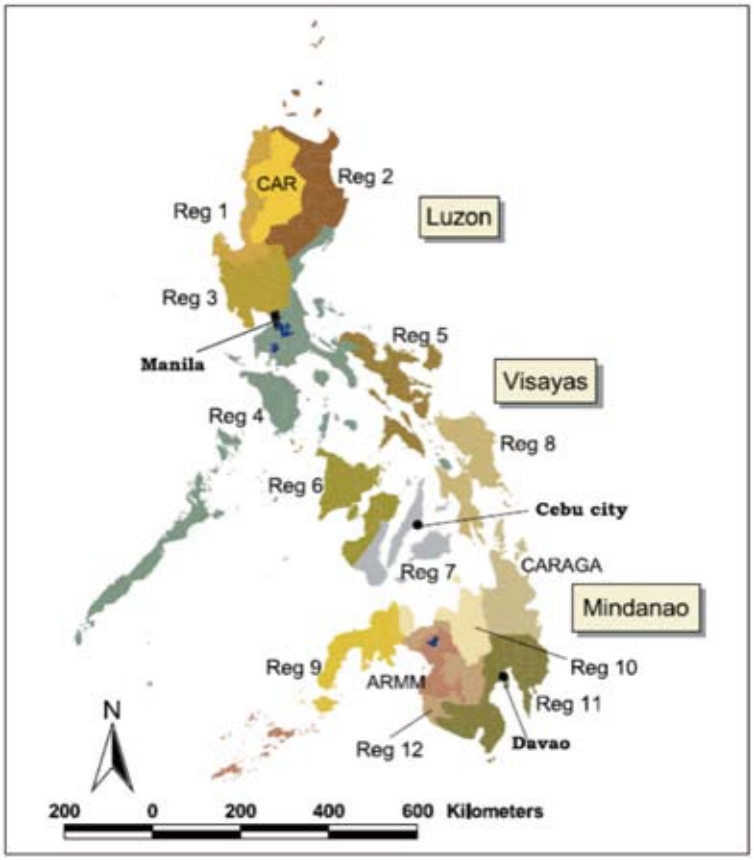
Annex 1: Political regions of the Philippines



Annex 2: Area reforested 1960 - 2009

Year	Grand	Government			Non-Government Sector						
				Other Government	Total	Timber Licensees 1/		IFMA/SIFMA/CBFMA		Other	
	Total	Total	DENR	Agencies				TFLA/PLA/ ITPLA	PD 1153		
Total	1,957,404	1,286,014	1,146,047	139,966	616,602	417,364		105,677		60,892	
2009	54,789	53,840	53,840		949.60			949.60			
2008	43,609	27,752	27,752		15,857			1,111		14,746	
2007	27,839	25,026	8,838	16188	2,813			2,813			
2006	7,223	4,476	4,476		2,747				-	2,747	
2005	16,561	7,187	7,187		9,374	341		6,339		2,694	
2004	20,333	12,435	12,435		7,898	2,836		4,430		632	
2003	15,087	13,195	6,565	6,630	1,892	841		1,051	-	17	
2002	25,620	20,682	9,111	11,570	4,939	564		3,850		525	
2001	31,441	26,524	26,484	40	4,917	1,409		3,040	-	468	

2000	27,632	21,740	19,059	2,681	5,892	1,989		3,421	-	482	
1999	42,166	31,184	30,831	353	10,982	2,301		4,603	-	4,078	
1998	42,368	33,219	32,643	576	9,149	8,236	2/	-	-	913	3/
1997	66,237	49,301	48,490	811	16,936	14,357	2/	-	-	2,579	
1996	46,096	18,869	18,869	-	27,227	20,005	3/	-	-	7,222	2/
1995	65,233	21,841	7,840	14,001	43,392	30,380	3/	-	-	13,012	2/
1994	49,551	18,032	18,032	-	31,519	9,468		18,729	-	3,322	2/
1993	19,211	6,347	6,347	-	12,864	12,692		172	-	-	
1992	40,593	24,304	24,304	-	16,289	11,683		4,606	-	-	
1991	93,039	73,602	72,238	1,364	19,437	18,089		1,348	-	-	
1990	191,663	153,949	146,718	7,231	37,714	33,443		3,749	-	522	
1989	131,404	89,452	82,966	6,486	41,952	32,087		6,526	-	3,339	
1988	64,183	31,226	30,890	336	32,957	23,126		9,831	-	-	
1987	39,811	28,843	27,558	1,285	10,968	7,956		1,118	1,296	598	
1986	32,998	24,426	22,495	1,931	8,572	6,572		1,625	368	7	
1985	24,231	12,684	12,201	483	11,547	8,148		1,500	1,228	671	
1984	38,935	16,088	15,520	568	22,847	14,186		7,011	1,650	-	
1983	78,538	42,239	27,155	15,084	36,299	31,703		3,554	1,042	-	
1982	63,262	35,201	31,202	3,999	28,061	21,588		972	5,501	-	
1981	64,541	33,296	30,707	2,589	31,245	20,096		6,482	4,667	-	
1980	60,516	39,881	32,956	6,925	20,635	15,579		1,162	3,894	-	
1979	79,397	51,858	35,305	16,553	27,539	20,132		545	6,017	845	
1978	78,425	44,686	34,343	10,343	33,739	22,006		5,001	6,523	209	
1977	53,263	33,365	23,677	9,688	19,898	17,276		1,088	500	1,034	
1976	31,733	23,228	20,977	2,251	8,505	8,275		-	-	230	
1975	15,280	15,280	15,280	-	-	-		-	-	-	
1974	4,994	4,994	4,994	-	-	-		-	-	-	
1973	5,787	5,787	5,787	-	-	-		-	-	-	
1972	4,831	4,831	4,831	-	-	-		-	-	-	
1971	6,458	6,458	6,458	-	-	-		-	-	-	
1970	11,801	11,801	11,801	-	-	-		-	-	-	
1969	7,511	7,511	7,511	-	-	-		-	-	-	
1968	6,869	6,869	6,869	-	-	-		-	-	-	
1967	5,327	5,327	5,327	-	-	-		-	-	-	
1966	7,396	7,396	7,396	-	-	-		-	-	-	
1965	11,709	11,709	11,709	-	-	-		-	-	-	
1964	16,822	16,822	16,822	-	-	-		-	-	-	
1963	11,543	11,543	11,543	-	-	-		-	-	-	
1962	7,474	7,474	7,474	-	-	-		-	-	-	
1961	11,543	11,543	11,543	-	-	-		-	-	-	
as of 1960	54,531	54,531	54,531	-	-	-		-	-	-	

1/ Philippine Forestry Statistics

2/ Planning & Policy Studies Office

3/ DENR

Note: 2005 data- preliminary,

Annex 3 : Key players and their roles in forest restoration in the Philippines

Players	Roles
Congress(Senate and House of Representatives)	Congress has the mandate to provide the legal framework for forest development and management, including reforestation. P.D. 705 (as amended by P.D. 1559) was issued 35 years ago and does not address current needs and challenges.
The President	Since 1965, the Administration of President Ferdinand Marcos issued the most policies relevant to rehabilitation. However, Presidents Corazon Aquino and Fidel Ramos initiated the Forestry Sector Projects. Presidents Joseph Estrada and Gloria Macapagal-Arroyo have merely sustained past policies and programmes, particularly FSP.
Department of Environment and Natural Resources	The DENR is the agency concerned with forest rehabilitation. It promulgates rules and regulations that translate the law into concrete terms. The Secretary is responsible for issuing Administrative Orders and Memorandum Circulars that guide the implementation of forest laws or decrees issued by the President. On the ground, outcomes are largely influenced by the dedication and competence of field offices and staff at the regional, provincial and municipal levels, and their ability to mobilize local support and resources.
Private sector	Individuals, corporations and legal entities from the private sector lease public forest lands under various arrangements, some of which provide for forest rehabilitation. The extent of their contributions depends on the policies, incentives and support available, including technical and marketing tools.
Local Government Units	The Local Government Code empowers LGUs to enforce forestry laws and implement reforestation and other forestry projects, in partnership with the DENR and communities. Some LGUs in Luzon and Mindanao have passed provincial/municipal resolutions to appropriate funds to finance CBFM and reforestation projects. Successful initiatives include those established by the provincial governments of Nueva Vizcaya in Northern Luzon and Bukidnon in Mindanao and by the municipality of Pilar, Bohol in the Visayas.
Other government and semi-government agencies	The National Irrigation Administration, National Power Corporation, and the Philippine National Oil Company, among others, are tasked with rehabilitation of watersheds in their jurisdiction. More recently, the Department of Finance has been involved in some initiatives, in partnership with LGUs, under its Community-Based Natural Resources Management Project which is supported by the World Bank.

Players	Roles
Upland farmers/local communities and POs	Until the early 1970s, indigenous people and migrants were simply hired as laborers in reforestation projects and did not have secure tenure over the land they occupied. More recently, the government encouraged upland farmers and communities to form People's Organizations and play a larger role in rehabilitation projects. It contracts them to plant, maintain and protect resources and may grant them secure tenure over the land they reforested so they can serve as long-term stewards.
NGOs and other members of civil society	NGOs and other members of civil society such as religious groups and the media operate nationally and locally. Their influence ranges from providing technical and financial support to POs; policy advocacy; legal assistance especially to indigenous people; implementation, monitoring and evaluation of reforestation projects; and promoting community actions and demands. In accordance with the Local Government Code, civil society sits on municipal, provincial and regional development councils, the Protected Area Management Board and other policy-making bodies. Its engagement was instrumental in passing E.O. 263 (CBFM) and the National Integrated Protected Area System Act of 1992, both of which include reforestation components.
Academic and other research institutions	These institutions promote the development of policies and programs based on science; provide technical assistance and support; monitor and evaluate projects; critique government policies, programs and projects; and instill a people-oriented attitude in new forestry graduates.
Funding institutions	Multilateral and bilateral funding institutions drive reforestation policies and programs in the Philippines through financial and technical support. Chief among these are ADB, World Bank, JBIC, USAID, IFAD, ITTO, Ford Foundation and the governments of New Zealand and Germany.

Source: Modified based on Pulhin (2003)

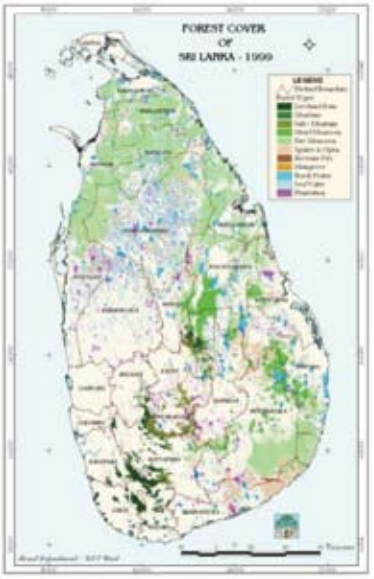
Managing the Forests in Post-Conflict Sri Lanka

H G Wasantha

Assistant Conservator of Forests
Forest Department

1. Overview

SRI Lanka is an island in the Indian Ocean, located between 5°54' and 9°52' North Latitude and 79°39' and 81°53' East Longitude. It spans 65,610 km^2, has an estimated population of 20.3 million and a population growth rate of about 1.4 percent. At 319 persons/km^2, the country ranks 19th highest in the world in terms of density and it is the most populous of the South Asian Association for Regional Cooperation (SAARC). Some 76% of Sri Lanka's citizens live in rural areas and the economy is predominantly agriculture. The annual per-capita income is around US$740.



2. Forest Cover and Administration

In 1999, forests covered close to 2 million ha, or 30.8 percent of total area: 1.46 million ha of dense forests and 0.46 ha of sparse forests (Table 1). Forest area per capita is around 0.11 ha and estimated annual deforestation is 0.8 percent.

Table 1. Forest cover

Type	Hectares	% of land area
Montane Forest	3,099	0.05
Sub-Montane Forest	65,792	1.00
Lowland Rain Forest	124,341	1.90
Moist Monsoon Forest	221,977	3.38
Dry Monsoon Forest	1,027,544	15.66
Riverine Dry Forest	18,352	0.28
Mangroves	9,531	0.14
Total Dense Forest	1,470,636	22.42
Sparse forests	471,583	7.19
Total	1,942,219	29.60

The area of forest plantations in 2005 was 96,250 ha, mainly comprising of teak, eucalyptus, pine, acacia and mahogany (Table 2).

Table2. Forest plantations by species

Category	Hectares
Teak	30,277
Eucalyptus	24,346
Conifers (Pines)	17,240
Mahogany	5,325
Acacia	8,830
Miscellaneous	10,282
Total	96,250

Sri Lanka has initiated many activities to conserve natural forests for the rich biodiversity they harbour, the soil they retain, the hydrological functions they provide, and the cultural and aesthetic values they offer. Protected forests cover an estimated 15 percent of total area and, as shown in table 3, are administrated by both the Forest Department and the Wild Life Conservation Department.

Table 3. Protected forest administrated by two departments

Forest Department			Wild Life Conservation Department		
Established 1887 Forest Ordinance of 1907 National Heritage and Wildness Area Act - No. 3 of 1988			Established 1939 Fauna and Flora Protection Ordinance - No. 2 of 1937		
Categories	Numbers	Extent (ha)	Categories	Numbers	Extent (ha)
National Heritage	01	11,187	Strict Nature Reserves	03	31,573
Conservation Forests	38	30,265	National Parks	18	505,449
Reserved Forests	232	575,228	Nature Reserves	07	51,062
Residual Forests	257	563,547	Sanctuaries	56	283,326
			Jungle corridors (proposed)	02	

3. Policies, Vision and Mission of the Forest Department

The first National Forest Policy was published in 1929 and, as the need arose, was amended to address emerging issues. The most recent version of 1995 emphasizes the importance of sustainable forest management and guides the Forest Department's planning and implementation of activities. Its objectives are to

- conserve forests for posterity, with particular regard to biodiversity, soils, water, and historical, cultural, religious, and aesthetic values
- increase forest cover and productivity to meet the needs of present and future generations for the goods and services these resources provide
- enhance the contribution of forestry to the welfare of the rural population and to the national economy, paying special attention to equity issues.

The **vision** of the Forest Department is to conserve and develop Sri Lanka's forest resources to ensure the prosperity of the nation. Its **mission** is to sustainably manage natural forests and trees to meet increasing demand for timber, for other forest products, and for the range of forest services, including environmental, as a means to ensure the well being of people and the economy.

4. Administrative Structure of the Forest Department

The Conservator General of Forests heads the department and is assisted by three Conservators of Forests who each take charge of one of the following sections: Operations; Research and Education; and Personnel and Administration. In addition, a separate division performs day to day financial management. At Head Office, five Deputy Conservators of Forests each manage 1 of 5 divisions: Forests Inventory and Management; Social Forestry and Extension; Environmental Management; Law Enforcement and Protection; and Planning and Monitoring.

In the field, Regional Deputy Conservators of Forests are responsible for the country's four forest regions which are sub-divided into five divisions, including an administrative district, headed by Divisional Forest Officers. Each division is again divided into several ranges which are the primary units for implementing forest operations and delivering services to the public. Ranges are further broken down into forest beats and again into blocks - the smallest administrative unit of the Forest Department. Forest Ordinance (1970) empowers officers to perform duties related to the protection of forest resources. They carry out these tasks with technical advice and training they receive from the Research Division and the Sri Lanka Forests Institute.

5. Flowering Plants in Sri Lanka

Sri Lanka has 4,143 flowering plant species which are classified under 1,522 genera and 214 families. Indigenous species comprise 47.5%, endemic 27.5%, cultivated exotics 17%, and naturalized exotics 8%.

More than 90% of the species Dipterocarpaceae, Nepenthaceae and Monimiaceae are endemic as well as between 80 and 90% of the species Melastomataceae and Clusiaceae. About 70-80% of species in the families of Lauraceae, Anacardiaceae, Araceae Bombacaceae, Dilleniaceae and Gesneriaceae also are endemic, compared with 60-70% of Plamae and Ebenaceae .

6. Sustainable Management of Natural Forests and Forest Plantations

The first Forestry Sector Master Plan (1986) was replaced in 1995. This latest version promotes sustainable forest management in Sri Lanka and covers a 25-year period. It is the basis for long-term strategic planning in the sector and has guided the preparation of separate plans for Sinharaja, Knuckles, Kanneliya, Hurulu Kele and other important forest areas in the wet and dry zones - forests which are open to the public and can be used for eco-tourism. Along similar lines, with the help of FORDATA/FORMPLAN databases, separate plans have been developed to manage plantations of teak, eucalyptus, pine and mahogany. In addition, each range office has prepared complementary five-year operational plans.

With regard to the establishment and sustainable management of forest plantations, the operational plans prepared by range offices reflect provisions set out in the National Forest Policy such as reforestation of clear-felled plantation sites; rehabilitation of degraded plantations; establishment of buffer zones for multiple uses; enrichment of low stock plantations; restoration of natural forests for multiple uses, including production; and conversion of pine monoculture plantations into mixed broad leaved species. The following silvicultural treatments are applied in select forest plantations: cleaning and cleanup cutting, singling, pruning, pre-commercial thinning, commercial thinning, and coppice maintenance.

7. The Role of Forests in Sri Lanka

In terms of economic aspects, forests in Sri Lanka supply the market with wood and non-wood forest products. In addition to enhancing rural livelihoods by increasing agricultural productivity and improving food and nutritional security, they perform environmental functions such as soil and water protection, wildlife habitat, and carbon sequestration.

8. Establishment of Forest Plantations

As noted earlier, the Forest Department establishes forest plantations for different purposes, using various means, depending on need:

- regeneration cuttings
- rehabilitation of degraded lands
- buffer zones
- enrichment of degraded plantations
- farmer woodlots.

9. Timber Source and Supply

Most industrial round wood is produced domestically. In 2009, teak and pine were the major

species used.

- Thinning yield - 205,263.01 m^3
- Regeneration cutting yield - 399,792.41 m^3
- Total yield - 605,055.42 m^3
- Market value - Rs. Mil. 2,394

10. Forest Management Post-conflict

For more than 30 years, the Eastern and Northern Provinces of Sri Lanka, including 8 administrative districts, were not secure. However, the Forest Department was able to initiate activities in the former in 2009 and in the latter in 2010. Total land area and forest area are shown below.

Province	Total Land Area (Km^2)	Forest Area(Km2)	%
Eastern	9,996	3,436.08	23.27
Northern	8,884	4,490.50	50.51
Total	18,880	7,926.58	41.98

10.1 Establishment of range offices and allocation of staff

New range offices have been established in Eastern Province and the Forest Department hopes to expand its presence in the Northern Province.

10.2 Survey and demarcation of forests

Due to security issues, it was not possible to survey and demarcate forests in the Eastern and Northern Provinces when the Forest Department carried out this work in the rest of the country. Efforts are now underway in Eastern Province.

10.3 Working with programmes

Support under various programmes, such as those listed below, enabled the Forest Department to implement a number of activities.

10.3.1 Negenahira Navodaya Programme

In 2009, the Forest Department achieved the following outcomes, mainly in Eastern province:

- production of seedlings - 40,000
- development of home gardens - 420 HG
- establishment/management of farmers woodlots - 230 ha

- school programmes - 22

10.3.2 Wadakkin Wasantham Programme

The government is implementing this one-year programme in Northern Province. Activities suggested are as follows

- production of seedlings - 26,000
- awareness raising activities - 11
- development of home gardens - 50 HG

10.3.3 World Food Programme

The World Food Programme (WFP) is assisting the Forest Department with a special initiative in Eastern and Northern Provinces that will contribute to climate change mitigation and adaptation, as a supplement to its regular food programme which the Ministry of National Building and Estate Infrastructure Development is implementing. Forestry related activities in Eastern Province in 2009 consist of the following:

Component	Target	Progress
Home gardens	800 HG	800 HG
Tree planting on canal banks	12 km	12 km
Rehabilitation of tank catchments	10 ha	10 ha
Rehabilitation of mangroves	2 km	2 km

In addition, the Forest Department expanded activities to Vavunia district (Northern Province) in 2010, as follows:

- development of home gardens - 1,900 HG
- rehabilitation of tank catchments - 60 ha
- rehabilitation of mangroves - 7 km
- farmer woodlots - 45 ha
- village nurseries - 51,000 seedlings
- demarcation of forest boundaries - 10 km
- planting along canals - 25 km

Forest Management in Thailand

Preecha Ongprasert

Forest Officer
Community forest Management Bureau
Royal Forest Department

1. Introduction

Generally, the loss and degradation of tropical forests are no longer only the concern of affected nations but also of the international community because of the damage such consequences have on the health of the environment. The destruction of tropical forests, therefore, is the topic of major global discussions, especially because science has shown that these resources house rich pools of biodiversity.

There is no doubt that remaining forests need to be protected and that deforested areas need to be replanted. Moreover, there is no disagreement that local people must be involved in conservation efforts if they are to succeed. In this respect, participation is an essential element of sustainability and should be considered synonymous with the term. Although both concepts are widely accepted, participation is subject to many interpretations and takes many forms. For some, forest conservation is participatory only if projects are locally initiated and decisions are made by the affected people.

Recently, the rights of people living in or near protected areas are receiving more international attention and, once again, social or participatory forestry is central to these debates. At a national level, participation in the protection of the environment and natural resources is often regarded as crucial to poverty reduction due to their importance in meeting the needs of rural inhabitants for fuelwood, construction material, food and fodder, for example. There is also a basic assumption that people who depend on forest goods and services have a vested interest in protecting these resources.

This paper describes the background and situation of forest management in Thailand, providing an overview of the historical context, institutional framework, and current programmes under the responsibility of the Royal Forest Department (RFD), including community forest management.

2. General Background and Information of Thailand

The Kingdom of Thailand is located in Southeast Asia (Figure 1), between latitudes 50^0 35′ - 20^0 15′ North and longitudes 97^0 30′ - 105^0 45′ East. Total area is 513,115 km^2. Mountainous areas in the upper part of the country form the headwaters of its most important river, the Chao Phraya. Highlands in the Northeast run eastward to the Mekong River and act as a natural border with Lao PDR. The long peninsula of southern Thailand separates the South China Sea in the east and Andaman Sea in the west.

Figure 1 Southeast Asian Countries

Its climate is tropical, dominated by the southwest monsoon from May to October, which brings high rainfall and humidity to the region. Average annual rainfall ranges from 1,250 mm in the northeast to more than 4,000 mm in the southern peninsula. Dry season runs from November to April, with relatively cool temperatures until February. March through May is dry and hot. Average annual temperature is 28.9^0 C.

In 1961, the population of Thailand was recorded as 30 million, compared with 65 million in 2007. Annual growth rate is 0.66%. Population density is approximately 126 people/sq.km^2: 1,269 people/sq.km^2 in municipal areas and 89.1 people/sq.km^2 in non-municipal areas. According to the Office of the National Economic and Social Development Board (NESDB), GDP per capita in 2007 was US$ 9,200.

3. Forest Resources

3.1 Forest Area

Given Thailand's variable climate and topography, forests are a complex mosaic of dry open deciduous, evergreen and mangrove. Forests and forestland are state property and the responsibility of three departments in the Ministry of Natural Resources and Environment (MONRE). The administrative framework for forest resource management is described in section 6.

According to the Forest Act (1941), "forest" is defined as land that has not been taken up or acquired by any other means in relation to land law. Rapid population growth and economic development between 1960 and 2006 resulted in a reduction of forestland from 53.33% to 30.92% of land area (Figure 2) - an average decrease of 1% or more than 2,000 km^2/year. The worst losses occurred from 1976 to 1982 when forest cover decreased 6.2% annually as a result of the political conflict between democracy and communism. In an attempt to decrease the opposition's base, government encouraged people to settle in zones which the communists seized and it fully supported them in terms of infrastructure and household

needs. This policy encouraged much slash and burn activities until the cold war ended in 1985.

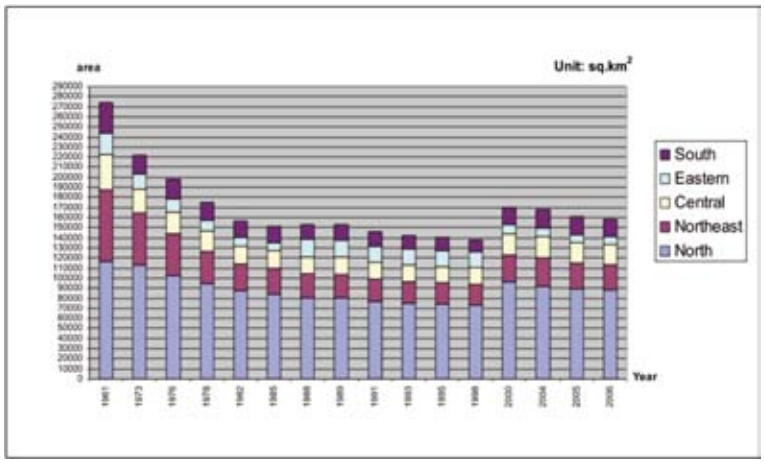


Figure 2 Change in forest area, 1960-2006

4. Deforestation and Forest Encroachment

Forest resources provide a multitude of goods and services, including pulp, timber, non-timber products, medicinal and edible plants, as well as other raw materials such as rattan and bamboo. More than 1,000 recorded species of plants contain medical properties and 30,000-40,000 households harvest them on a full-time basis. Furthermore, 60% of the rural population or roughly 30,000 communities living near forests rely on edible plants for their daily needs and more than 500 species of these plants are sold in local markets throughout the country.

In terms of trade, Thailand has a long history of using its forests for commercial purposes, dating back to the mid-19th century when the first logging concessions of teak were issued to private enterprises. The removal of mature timber stands allowed immigrants and forest dwellers to settle. However, the drivers of deforestation shifted in the 1980s when rapid economic growth replaced subsistence crops with cash crops. In 1989, alarmed by the high conversion rate of forestland, the government revoked all terrestrial concessions by decree. However, the logging ban was not enough to bring forest loss to a halt. At the present time, decreases in forest area are mainly due to agricultural expansion, other land uses, intensified shifting cultivation, and poaching.

Currently, more than 1 million households are living within Thailand's national forest reserves. The forest dwellers depend on the forest mainly for non-timber forest products and as a safety net in times of hardship. The forests also provide a source of cash income, a capital asset and employment. As Figure 2 shows, deforestation and forest encroachment decreased noticeably after the Royal Thai Government imposed a logging ban in 1989 and began to protect forests. Rural poor people and owners of land bordering natural forests who tried to expand their farms into those areas have been accused of deforestation and encroachment. Some argue that, with no visible signage, it is difficult to identify the boundary of the

reserved forest. In addition, the tribes and minority ethnic Thais who live in the mountainous areas consider shifting cultivation a traditional way of life, mostly in catchment areas in the north and northeast - a practice which affects soil fertility upstream and water quality downstream. The Royal Forest Department (RFD) and other agencies, especially through the Royal Initiative Project, have tried to mitigate the harmful consequences of these activities by teaching soil conservation techniques and offering promising crops to support a better living for settlers. Meanwhile, extension workers, including NGOs, have raised awareness among forest dwellers of the importance of soil and nature conservation and are implementing strict control measures. These and other endeavors are helping to slow the rate of deforestation.

In the dry season, the forest ecosystem is vulnerable to fire - a major cause of forest degradation. Fires are the cheapest way to clear land in upland farming; they stimulate the growth of young leaves and grass for cattle grazing; and make it easier for hunters to track down wild animals. Small fires to burn ground vegetation are also used as a means to prevent bigger fires that could be detrimental to forest trees. Uncontrolled and unmanaged fires, however, cause significant damage to forests every year. In this regard, fire prevention and fire fighting is one of the RFD's most costly activities.

5. Forest Plantations

A plantation of teak (Tectona grandis) of less than 1 ha was first established in northern Thailand, in Mae Paan Forest, Phrae Province, in 1906. As of 2006, the RFD had planted 823,235 ha, while state enterprises - Forest Industry Organization (FIO) and Thai Plywood Co. Ltd. - planted 41,051 and 4,150 ha respectively (Box 1).

Box1 Information of reforestation in Thailand

Reforestation in Thailand dates back to the beginning of the 20th century. Foreign concessionaires planted mostly teak after harvesting logs according to their contract with the Royal Thai Government - around 8,500 hectares up to 1960. When the National Economic, Social and Development Plan (NESDP) was introduced in 1961, it was the first time that Thai policy called for the reforestation of degraded forestlands, an initiative that has continually expanded since then. Due to the government's strong commitment to rehabilitate degraded forests and increase forest cover, it launched many effective campaigns over the past three decades. Since 1965, the planting of some 650,000 ha helped to increase forest cover from 25.28% in 1998 to 30.92% in 2006. Between 1981 and 1990, an additional 40,000 ha were planted annually, reaching 160,000 ha in 2006. More particularly, the 1985 forest policy called for 40% forest cover or 20,480,000 hectares. To date, another 7,360,000 ha is needed to meet the national target.

Initial planting programmes took place on lands belonging to the state and were executed by the RFD, the Forest Industry Organization and Thai Plywood Co. Ltd. The government is encouraging commercial enterprises to invest their own funds in tree planting while other forestry businesses are participating in the successful reforestation campaign in commemoration of the Royal Golden Jubilee. By 2006, 49,255 ha had been reforested, 53% of which resulted from this campaign.

Also in 2006, the RFD established a 10-year Master Plan for Economically Viable Tree Planting to be conducted by the RFD, the Economical Tree Organization (which will be established according to the plan), and private companies. The intention of this initiative is for government to gradually hand over reforestation to the private sector. In this regard, it will provide a budget of 170,131,445,000 Baht (1$ = 30 baht in October 2010) for ten years. The target for 15 years is 2.4 million ha or approximately 240,000 ha per annum.

Businesses are also supporting reforestation through a programme of corporate social responsibility. In addition, citizens, communities, schoolchildren, Buddhist monks, educational institutes and villagers are joining efforts to plant trees on degraded forestlands on special or national memorial days every year. These activities are over and above the assistance that the RFD provides through Royal Initiative Projects. Furthermore, RFD nurseries in provinces and regions throughout the country distribute millions of seedlings to people and rural communities under the community forest programme which saw more than 272,000 ha planted in 2007. These trees not only make the areas green but are also future additional sources of timber and non-wood forest products.

6. Protected Areas

According to the National Forest Conservation Act (1964), 9,394,151 ha or about 59% of forestlands are declared national conserved forests to protect them from clearing, degradation and occupation as well as to conserve them for amenity, recreation, education, and genetic resources. After the RFD was restructured in 2002, responsibility for protected areas was transferred to the National Park, Wildlife, and Plant Conservation Department. By 2005, 103 national parks, 84 forest parks, 55 wildlife sanctuaries, 56 non-hunting areas, 16 botanical gardens, and 55 arboreta were spread across the country. They are all protected and strictly controlled by laws such as the National Park Act (1961, amended in 1992) and the Wild Animal Reservation and Protection Act (1960, amended in 1992).

7. Timber Production, Imports and Exports

Before the logging ban in 1989, timber production was about 2 million m^3 per annum, sufficient for national consumption and export. Since that time, however, especially during Thailand's economic development in the 1990s, the supply of hardwood falls short of domestic demand, as does the demand for other industrial wood products (e.g., sawn-timber, plywood, veneer sheets, wood panels, and particle board). Although some timber is available from forests that are cleared for infrastructure development (e.g., roads and dams) or from the confiscation of illegal logs, forest plantations and old rubber plantations are other sources. By 2007, Thai traders imported 1.9 million m^3 of logs and sawn-timber from 71 countries to satisfy domestic demand, mainly Malaysia, Lao PDR and Myanmar. By the same token, Thailand exported 1.8 million m^3 of logs and sawn-timber to 66 countries, mainly China and Malaysia.

8. Policy Framework for Forest Management and Conservation

Communities located within and near forests have been motivated to participate in the sustainable management of natural resources through well designed conservation policies and legal frameworks which have been amended to address rapid social change and emerging environmental issues. However, some policies, laws, and institutions have not yet been adjusted to adequately respond to the needs of many stakeholders who have been invited to get involved in forest management. Programmes often act as barriers to effective participation, especially in community forestry. Weak managerial and technical capacity in both government and communities are also key constraints which make the sector vulnerable to illicit activities such as illegal logging and encroachment. Stronger policies, legal frameworks and institutional structures to deal with the problems associated with natural resources management are therefore critical to achieving sustainable development in the long run.

8.1 National Forest Policies

The first 5-year National Economic, Social and Development Plan (NESDP), implemented in 1962, set the first explicit goal for forest management and conservation and stipulated the need to maintain 50% forest cover. At that time, an estimated 53% of the country was forested. Between 1964 and 1992, consistent with the 1964 National Forest Reserve Act, RFD issued more than one thousand ministerial regulations, declaring almost half the country national forest reserves which the government controlled for production and extraction. The national target for forest cover was reduced to 40% in the fifth NESDP (1982-1988) to reflect economic and social conditions. This move led to the first comprehensive National Forest Policy (1985) which further specified that the 40% cover be broken down into 15% conservation forest and 25% economic forest. The tenth and most recent NESDP (2007-2011) has maintained the 40% target but interpretation of 2007 remote sensing data indicates 33.09% forest cover - almost 7% below the stated goal.

A year after a devastating flood in the south of Thailand in 1988 - believed to be caused by an increase in deforestation - government imposed a logging ban in natural forests and reversed the ratio of conservation to economic forests to 25% and 15% respectively, figures which remain current to this day.

The Forest Act still recognizes forestlands outside forested areas as belonging to the state, even though no trees may be standing. To improve forestland management, government classified the areas into 3 zones, as detailed in Box 2.

8.2 The Constitution

After the military coup in 2006, non-parliamentarians were appointed to draft the Constitution. More than twenty academics from political science, public administration and law were also involved in the process. The document contains a number of innovative provisions with respect to environmental conservation and sustainable use of natural resources. Participation at all levels of society is well appreciated and recognized within this Constitution.

Major policies related to natural resources management, including forests, are described below.

Box 2 Classification of National Forest Reserves

In 1989, 23.6 million hectares (45.9% of the total area) were gazetted as National Forest Reserves and classified into 3 zones as follow:

The C-Zone, Conservation Forest consists of areas formerly designated as protected forests and natural forests where human activities are minimal. However, some areas are still used for agriculture and shifting cultivation. Different forest management activities are also taking place in this zone, including the establishment of protected areas - for example, class 1 watershed areas, national parks, wildlife sanctuaries, forest parks, non-hunting areas, biosphere reserves, botanical gardens, and arboreta. By law, people are not allowed to inhabit, cultivate or utilize these gazetted areas. Since a significant number occupied this territory prior to the changes, their evacuation is widely controversial at both local and national levels. As a compromise, government introduced community forestry in an attempt to motivate those living in and near such areas to become involved in resource management. So far, however, the issue remains unresolved and the Community Forest Bill is still pending.

The E-Zone, Economic Forest has been designated for commercial plantations and reserved area for landless farmers. The forest is absent, scarce or in poor condition, with cattle grazing in the open fields. Various stakeholders are looking to this zone to expand production forests, establish community forests, or use it for agriculture or agroforestry.

The A-Zone, Agricultural Uses is designated as suitable for agriculture and for allocation to landless farmers by the Agricultural Land Reform Office.

8.2.1 Communal rights in the conservation and use of natural resources (Article 56)

The Community Forest Bill, still awaiting decree, will give communities the right to design their own rules for the management, use and conservation of the forest in their regions.

8.2.2 The right to access information (Article 59)

Although, at first glance, the provision seems remotely related to forest conservation, this article provides a basis for transparency in public management, including the allocation of budgets and the performance of government agencies.

8.2.3 The duty of the state to promote and encourage public participation in the conservation and use of natural resources (Article 79)

The state shall promote and encourage public participation in the preservation, maintenance and balanced utilization of natural resources and biological diversity as well as in the promotion, maintenance and protection of environmental quality, in accordance with the principles of sustainable development.

8.2.4 The power and duty of local authorities in the management, maintenance and utilization of natural resources (Article 290)

The Constitution clearly assigns responsibility for the protection and maintenance of natural

resources and the environment to local authorities.

8.3 The National Economic and Social Development Plan (NESDP)

The purpose of the NESDP is to direct and co-ordinate public expenditures for economic and social development. Thailand is now implementing its tenth version, the planning of which was a major departure from traditional processes. It is not only based on a professional assessment but on input received from interest groups in every region of the country. This NESDP is explicit in terms of environmental and sustainable development priorities, with three of the twelve targets directed to these areas. The plan also has a chapter on people and community participation. It stipulates that "opportunities must be given to citizens and communities to participate in the planning, decision making, and evaluation of government projects that could have an impact on natural resources and environment". The plan further specifies that local people, including ethnic minority groups, must be involved in natural resources management and that government authorities will recognize this right.

8.4 The Environmental Quality Management Plan

In accordance with the National Environmental Quality Enhancement Act of 1992, Thailand completed its first Environmental Quality Management Plan in 1997 which covered the period between 1999 and 2006. It outlines two strategies for resolving natural resources and environmental issues: institutional reforms for the management of community forests, water resources, biodiversity and the protection of first class watersheds; and public participation as an instrument that will "instill in people the sense of ownership in natural resources and environment and maintain them".

8.5 Governmental Policy

New governments must declare their policies to Parliament before taking over administration of the country, especially those concerning natural resources and the environment. Usually, the policies encourage and support rehabilitation and conservation efforts as well as state the need to decentralize authority to the local level. However, after the coup in 2006, an unstable cabinet and government have slowed implementation.

8.6 The Fifth National Research Policy (1998)

The policy encourages and supports research that attempts to solve conflicts over natural resources through the involvement of people in their management.

9. Legal Framework for Forest Management and Conservation

Thailand, which once exported timber, is now a net importer and has high expectations of the role forests will play in nature conservation. Since 1989, all natural forest (25% of total area) is protected by law from commercial exploitation. Timber and pulp production are meant to be sourced from plantations of mainly teak and fast growing tree species, although this strategy is not fully developed. The relatively small area of teak plantations which the parastatal Forest Industry Organization established 25 years ago is just entering the productive phase. Private sector investment in plantations is rather negligible and only

recently a priority in national reforestation.

Apart from altering the country's timber trade balance, the focus on forest conservation is causing tension between authorities and Thai citizens, especially the more than 1 million households that, by law, are illegally inhabiting national parks, wildlife sanctuaries and national forest reserve lands. Balancing the protection of forests with their social, cultural and economic functions is a challenge that Thailand is still in the early stages of addressing.

Major legislation for the conservation of natural resources and the management of forests is listed below.

9.1 The 1941 Forest Act (amended in 1948, 1982 and 1989)

The Forest Act (1941) is among the country's early piece of legislation on forest management, the purpose of which was to control the harvesting of forest products. Conservation aspects were not included. The function and activities of RFD, which was founded in 1896, were mainly related to extraction. The original Act reflected the fact that Thailand had abundant and healthy forests but, beginning in 1961, a succession of NESDPs took into account the substantial decline that was occurring and the need to implement conservation measures.

9.2 The 1960 Wildlife Preservation and Protection Act (amended in 1992)

The National Park, Wildlife and Plant Conservation Department administrates this Act which focuses on wildlife conservation - the establishment of special territories as well as the possession and trade of wildlife and their carcasses, for example.

9.3 The 1961 National Parks Act

This Act is also the responsibility of the National Park, Wildlife and Plant Conservation Department. It provides for the determination, protection and maintenance of national parks and the establishment of a national park committee.

9.4 The 1964 National Forest Reserve Act

The Act provides for the determination of national reserve forests and assigns responsibility for their control and maintenance to RFD.

9.5 The 1992 Reforestation Act

This Act was promulgated to support and encourage private sector investment in plantations, as part of RFD's goal to expand planted area.

9.6 The 1994 Tambol Council and Tambol Administration Organization Act

This legislation is an attempt to strengthen the role of local government in natural resources use, planning and decision making.

9.7 The 1998 Decentralization Act

The Act contains guidelines for the election of community representatives to the Tambol Council.

10. Institutional Framework for Forest Management

10.1 National Level

Thanks to both a strong environmental movement and firm government commitment, there is much greater awareness of the need for forest conservation. On the administrative side, Thailand recognizes the role of national institutions in matters pertaining to the environment and natural resources but also considers it important to decentralize authority to the local level.

King Rama V founded the RFD in September 1896 to oversee teak concessions which were mainly awarded to western businesses. In an attempt to promote a more holistic approach to forest management, the government restructured the Ministry of Natural Resources and Environment (MONRE) into 3 departments, all of which employ experienced forestry specialists: Royal Forest Department (RFD), National Park Wildlife and Plant Conservation Department (NWPD), and Marine and Costal Resources Department (MCRD). Some duties related to forests and forestlands have also been assigned to the Office of the Permanent Secretary (Figure 3).

However, with regard to the formulation of policy and the functions of planning and management, authorities have overlapping responsibilities, for example, for the NESDPs and the Environmental Plan. While MONRE's three departments noted above are tasked with the daily administration and control of forest resources and biodiversity over more than half the country, MONRE's Office of Natural Resource and Environmental Policy and Planning also has a mandate to plan nature conservation and biodiversity protection. Hence, problems arise when policies are translated into laws which line ministries then administer. Implementation is further hampered because matters pertaining to the health of the environment do not take precedence over many regulations governing land use which fall under different ministries.

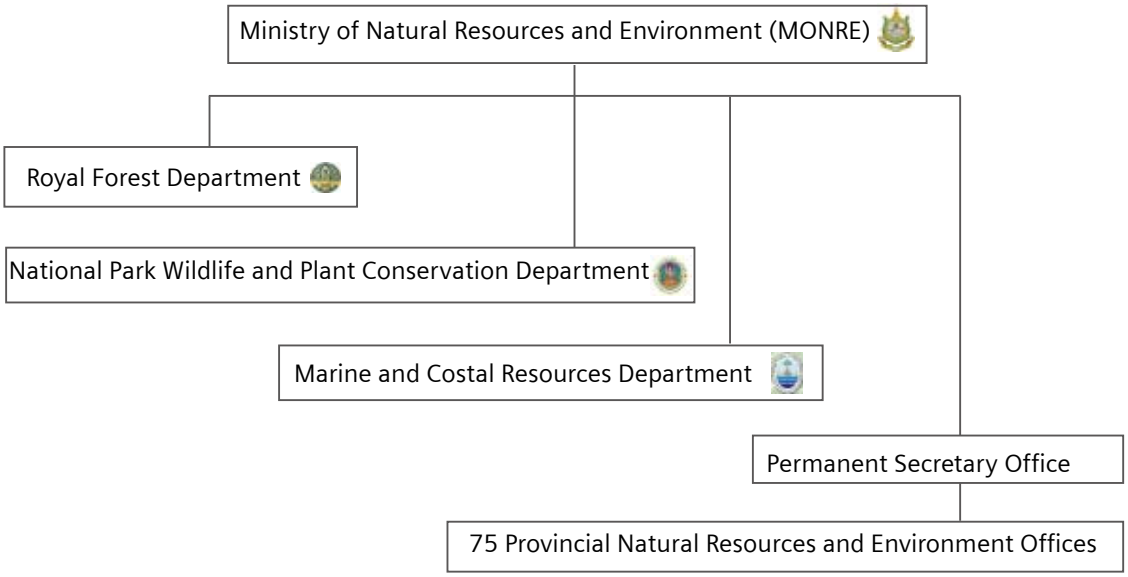


Figure 3 Administrative line of forest resource management of Thailand

In practice, MONRE coordinates inter-ministerial policies through the National Environment which the Prime Minister chairs. Conflicts over land use due to overlapping mandates emerge frequently - for example, mining, road construction, and infrastructure development in class 1 watersheds. Often disputes must be settled by cabinet resolution. Cooperation among authorities is needed while overlapping mandates and policies should be revised through a national steering committee or through departmental committees, sub-committees and task forces.

10.2 Local Level

Local authorities in Thailand consist of provincial administrative organizations, district organizations, and tambol organizations or TAOs (1 tambol = 10-15 villages). By the end of 1999, around 6,800 TAOs were established throughout the country, effectively passing authority to the grass-roots. The TAO Act of 1994 and the 1998 Decentralization Act clearly state the mandate and duty of TAOs in the protection and maintenance of natural resources and the environment within their jurisdiction. However, TAOs have exercised little power in these areas to date because most are still concentrating on infrastructure development. The role of other local authorities in the management of natural resources and the environment is not clearly specified in law.

11. Community Forests

11.1 Background

Community forests have long been part of Thailand's rural areas, as the chronology below shows. They are considered life-supporting in terms of community settlement and socio-cultural development. The concept can be traced back to WWII when government encouraged people to plant trees around temples, schools, and public areas on special occasions or events

such as Buddhist memorial days.

- 1941: Government promoted tree planting on state land during Buddhist memorial days.
- 1952: Government declared 24 June national Arbor Day and, each year, local offices distribute seedlings and make them available for collection.
- 1970: Forests for multi-purposes were established in forest areas near communities.
- 1976: Dispersed farmers who encroached in watershed areas were relocated under the forest village program and reforestation for environmental conservation was introduced.
- 1977: A voluntary tree planting program was launched to motivate people to grow trees in public areas such as along roadsides, temple yards, and school playgrounds.
- 1980: A firewood and woodlot program started for hill tribe people in watershed areas in the northern part of the country.
- 1982: A community woodlot project began by integrating the work of the RFD with similar efforts of other government agencies such as Land Development Department, Pioneer Department, and National Energy Office. Community development took place in parallel with forest management.
- 1987: Community forest management was put into operation, including the establishment of farmer groups, training, and nurseries.
- 1988: With support from UNDP/FAO/SIDA, 47 provinces collaborated on elements of community forestry.
- 1987-1994: With assistance from the Ford Foundation, RFD, the Faculty of Forestry of Kasetsart University, Chiang Mai University, and Khon Khen University, pilot projects on community forest management were implemented, many taking place from highland areas in the north to dry land in the northeast.
- 1997: RFD implemented community forestry systematically through long term planning, as a way to encourage the cooperation and participation of local people.
- 2000: The formal process to establish community forests was introduced, requiring communities to apply to RFD for approval.
- 2005-present: Nearly 8,000 community forests have been established across the country and programs to support their management have been launched.

11.2 Types of Community Forests

Community forests in Thailand are classified into two types: natural and rehabilitated or developed. They can be established on three categories of land: national reserved forest or public and overgrown areas; land under the jurisdiction of other government agencies (e.g., monasteries, educational institutes, military areas); and private locations.

The first type consists of natural forests where people in nearby communities join together to protect them in order to benefit from their productive capacity and to maintain their norms and culture. They include forests and trees:

- in non-hunting areas
- around monasteries
- in cemeteries
- in sacred sites
- in head waters
- in paddy fields
- for multiple uses (i.e., fuel wood, edible and medicinal plants).

The second type is a degraded forest that has been rehabilitated or developed for land and water conservation, food security, recreation, amenities and other purposes. They include:

- forest plantations for community purposes
- forest plantations within educational and religious institutions
- forest plantations under Royal Initiative Projects
- urban community forests.

11.3 Institutional Framework for Community Forest Management

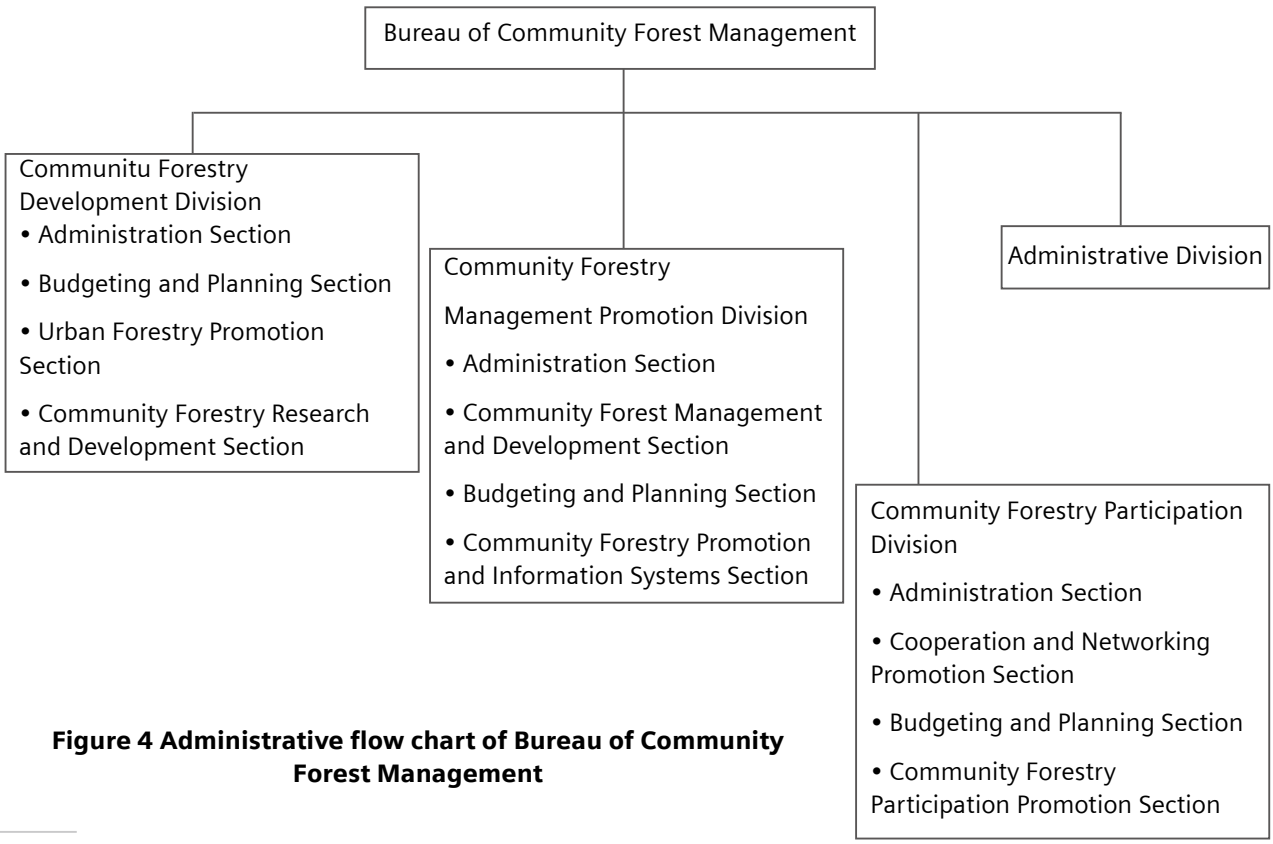


Figure 4 Administrative flow chart of Bureau of Community Forest Management

As the name implies, the Bureau of Community Forest Management is in charge of this programme. The chain of command and institutional composition are shown in Figure 4.

11.4 Legal Framework for Community Forest Management

Until 2 decades ago, when community forestry was officially recognized as a tool to achieve sustainable forest management, it had no legal basis in Thailand. Following the devastating flood in 1988 and the subsequent ban on logging, forest management began to focus on people rather than on the resource itself. As responsible agency, RFD promotes local participation in the management of community forests as well as legal rights to maintain, protect, and utilize the resources. The Community Forest Bill, however, is the subject of controversial debate and has not yet been decreed. Box 3 illustrates its evolution.

11.5 Approval and Establishment of Community Forests

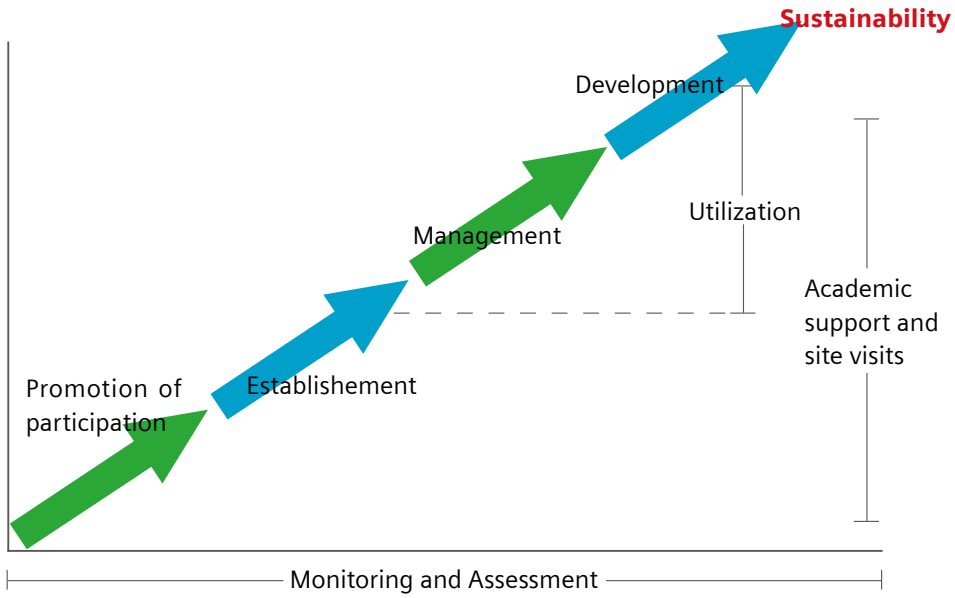
Once a community forest has been approved and established, it will be recognized by the government and receive full RFD support in terms of budget, technical assistance, empowerment and manpower. Government agencies will also recognize community forest committees which can then acquire funding from these organizations for development, using the forest as the resource base. The process is shown in Figure 5.

Box 3 Evolution of the Community Forest Bill

The Community Forest Bill was drafted in 1991 but has been revised several times. RFD invited communities to help develop the initial draft which recognized the legal status of communities living in and around national reserves and proposed they collaborate with RFD in the establishment and management of community forests. One year later, Members of Parliament approved the draft and sent it to the Office of the Council of State for review. From 1992 to 1995, an appointed committee revised it based on inputs from academics and public hearings. However, a group of unsatisfied people drafted another version in 1993 and, in 1994, campaigned government to accept it.

In 1996, the government assigned the National Economic and Social Development Board to organize consultations and draft a new Bill which was finalized in 1997. It defines where community forests could be located, along with permissible activities. It also calls for the appointment of a national committee to be responsible for policies and regulations governing community forest conservation and use. Some NGOs, specifically the “Peoples Movement” and the “Dark Green Movement”, strongly oppose this amendment. The former group calls on authorities to respect communal rights by permitting the establishment of community forests in protected areas if communities can prove they settled before 1993 (using large scale of aerial photographs) and can show they are able to protect the forests. The latter group advocates a strict conservation approach which forbids any community forest in protected areas. Additional attempts were made to accommodate both sides and Parliament approved this latest version in November 2007. The Bill now awaits the royal style, title and signature of HM the King.

Stages for establishment and approval community forests conducted by Royal Forest Department



11.6 Community Forestry Under RFD's Bureau of Community Forest Management

Table 1 highlights the number of villages and projects involved in community forestry as well as the area approved. Table 2 provides information on activities related to urban community forestry.

Table 1 Community Forest Approval and Establishment During the Year of 2000-2006

Year	No. of villages	No. of project approved	Area approved (Rai)1
2000	792	736	203,149
2001	800	723	230,269
2002	907	884	330,155
2003	828	753	100,725
2004	1,500	1,429	302,993
2005	410	269	61,878
2006	716	649	473,886
Total	5,953	5,369	1,718,781

Table 2 Promotion of Urban Community Forestry from 2001 to 2006

Year	Site est.	Personal training (Persons)	Information distri. (Pieces)	Seedling Distri. (Seedlings)
1. General activities for urban forest management				
2001-2006	214	1, 588	45,000	1,210,500
2. One Tambol - One City Park				
2005-2006	38	760	20,000	564,000

12. Summary

Participatory approaches to forest management are gaining momentum in Thailand and are seen as an effective way to address and resolve issues. However, decentralization and public involvement in policy, planning, and management of natural resources are still rather limited, even though local administrative organizations have been empowered to some extent in recent years and their input is being sought in the development of policies and legislation. Cooperation among authorities and stakeholders is crucial to ensure sustainable forest management in the long run.

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UN-REDD Programme and REDD+ in Viet Nam

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1. Introduction

When they met in Bali, parties to the United Nations Framework Convention on Climate Change (UNFCCC) recognized Viet Nam as one of the top five countries in the world most affected by climate change. It is one of nine countries chosen to pilot the UN-REDD Programme and one of the first to receive approval for a Readiness Plan Idea Note under World Bank's Forest Carbon Partnership Facility.

The objective of the UN-REDD Programme in Viet Nam is to assist government to develop an effective regime to help reduce the displacement of greenhouse gas emissions within the region; prepare the country to take effective action both nationally and regionally to reduce emissions from deforestation and forest degradation by the end of 2012; and be ready to implement a national REDD+ strategy by 2015. The target is to achieve readiness in three phases, the first of which began in 2009. It focuses on strengthening the institutional framework, (especially of central and local offices of the Ministry of Agriculture and Rural Development), developing the strategy, determining reference levels, raising awareness, and initiating a consultation process.

Within the framework of the National Target Program to Respond to Climate Change (NTP-RCC) and the Action Plan Framework (APF), the Directorate of Forestry in the Ministry of Agriculture and Rural Development is responsible for formulating and implementing REDD policies and programmes, for coordinating international assistance in this area, and for developing a national REDD+ strategy.

2. General Information

2.1 Forests in Viet Nam

Viet Nam covers 330,991 km^2 and has a complex topography consisting of mountains, a high plateau, plains and rivers - notably the Red River and the Mekong. The climate is monsoon, with average temperatures between 24°C and 27°C and average rainfall between 1,500 and 2,500 mm, mostly from May to October. Average population density is 232 people/km^2 - the highest in South East Asia - but it reaches up to 1,000 people/km^2 in the Red River Delta. These figures are much lower in the mountains. About 80% of people live in rural areas and 75% rely on agriculture and forestry for their livelihoods. Since 1986, the government has pursued doi moi as its economic development strategy, an approach which involves policy and institutional reform to achieve liberalization. Since implementation, growth in the country's GDP ranged from 6% to 9% per year between the 1990s and early 2000s.

Although 2008 data show total forestland as 19.2 million hectares, only 13.1 million hectares are forested: 10.3 million hectares of natural forests and 2.8 million hectares of plantations. The remainder comprises denuded hillsides and barren lands. There are three categories of forests in Viet Nam, namely special-use (mainly protected) - 2.2 million hectares; protection - 5.7 million hectares; and production - 8.3 million hectares. These resources are unevenly distributed throughout the country, from 5% of land area in the Mekong and Red River deltas, to 35% in the north-central and coastal south central regions, to 56% in the Central Highlands. Forest types include pine, broad-leaf, mixed coniferous, moist and dry dipterocarp in the uplands and dipterocarp, mangroves, bamboos, and mixed hardwoods in lower areas,

flats and wetlands.

Forest area in Viet Nam has varied considerably over the years. From 1943 to 1983, intensive utilization resulted in the clearing of about 50%. Forest cover hit a 27% low around 1990 but grew an average of 236,200 hectares or 2.5% per year until 2000. Between 2000 and 2005, it increased about 2.1% per annum, reaching around 3,568,000 hectares or 38.3% by 2008.

The government is taking a number of steps to reduce the threat of climate change and greenhouse gas emissions, including significant efforts to increase forest cover, despite the fact that initiatives are costly and of no direct economic benefit. The NTP-RCC and the APF, although both formulated prior to REDD activities in Viet Nam, address deforestation, degradation, carbon sequestration and other issues. Recently, the conservation and sustainable management of forests and the enhancement of forest carbon stocks are additional dimensions of REDD so that the concept is now referred to as REDD+. The NTP-RCC and APF approaches and objectives are fully consistent with REDD+ and the development of a REDD+ strategy.

2.2 Forest Categories and Alignment to REDD Credits

As noted earlier, forests are grouped into 3 categories: production (for commercial purposes); protection (for watersheds and the environment); and special use (primarily for biodiversity conservation). The challenge is now to align REDD+ credit mechanisms to these categories, in particular, special use forests where the economic benefit to forest users is not obvious. In such instances, the risk of converting forests to alternative land uses and of causing irreversible destruction of the original stands is high.

Given the complexity of Viet Nam's forests and their management, all forms of REDD+ credits would be appropriate:

- Reduction of emissions from deforestation: Many production and protection forests continue to face the threat of deforestation.
- Reduction of emissions from forest degradation: Many special uses, protection and production forests continue to face various threats of degradation.
- Enhancement of carbon stocks: Much production forest land is badly degraded or barren.
- Forest conservation: This aspect is pertinent to all areas of standing forest.
- Sustainable forest management: This aspect is pertinent to all areas of standing forest.

Forest land in Viet Nam is classified according to 8 regions, based on ecological and climatic parameters:

- North West sub-region (4 provinces)
- North East sub-region (13 provinces)
- Red River Delta (6 provinces, including Hanoi)
- Northern Central Coast (6 provinces)
- Southern Central Coast (8 provinces)

- Central Highlands (5 provinces)
- South East (6 provinces, including Ho Chi Minh City)
- Mekong River Delta (13 provinces).

In terms of ecosystem types, Viet Nam has fourteen of the terrestrial eco-regions found on WWF's list. Although many are severely degraded, each can potentially participate in REDD+ by either reducing emissions or enhancing carbon stocks.

2.3 Drivers of Deforestation and Forest Degradation

The drivers of deforestation and forest degradation in Viet Nam are multiple, complex and have changed over the country's history. The greatest loss in forest cover occurred between 1943 and 1993 when it declined between an estimated 20% and 43%, much as a result of war and agricultural expansion by the lowland Kinh people.

By the mid-1990s, the severely depleted and degraded forest estate precipitated a change in policy that sought to both stabilize and increase forest area. Several national initiatives were successful in halting deforestation and reversing forest degradation, notably the 661 Program, also known as the Five Million Hectare Reforestation Plan (5MHRP).

With these improvements, came new challenges and threats. Currently, the main causes of deforestation and forest degradation are:

- conversion to agriculture (particularly to industrial perennial crops)
- unsustainable logging (mostly illegal)
- infrastructure development
- forest fires

Although invasive species, mining, bio-fuels and climate change are also threats, but to a lesser extent at the present time, their evolution and impacts need to be closely monitored.

2.4 Unsustainable Logging

Unsustainable logging is the main cause of forest degradation - brought about by weak management, illegal activities and the need for rural households to satisfy their basic needs for fuel, construction material and food.

Although the scale of illegal practices is difficult to estimate, 25,817 violations of state regulations were reported in 2009 with respect to illegal logging and the trade of timber and other forest products (48,605m^3 of timber were confiscated). Lack of monitoring, mis-management of cases and little or no incentive to complete accurate reports make it likely that considerably more violations go undetected and unrecorded. Rural households, driven by poverty and desperation, commit some forest crimes but much is led and controlled by criminal gangs and networks. Selective logging is gradually degrading forests as well.

Demand for timber to make inexpensive furniture from tropical hardwood accounts for Viet Nam's becoming a major exporter of these manufactured goods, making wood products its

fifth largest export earner. The illegal harvesting and trade of timber have serious implications for the future of the industry and could limit the benefits that the country could derive from REDD+. With stricter requirements to show proof of legal provenance under the US Lacey Act and the EU FLEG-T initiative, for example, there is a growing need to stamp out the flow and use of timber from illegal sources. Although doing so will lessen forest degradation in Viet Nam, the danger of displacing illegal activities to other countries is a concern. Where proof of legal provenance is not required for imports of species not listed under CITES, such imports can be deemed legal even if they were illegally exported from elsewhere. REDD+ addresses this loophole as one of its core elements.

In addition to the above-noted drivers, other factors are leading to unsustainable and/or illegal wood extraction, including some of the current forest policies and programs; the forest land classification process which can cause the unnecessary removal of natural forests; the logging ban in some provinces; and low harvesting quotas which need to be replaced with a system that allows a higher procurement of timber.

Another key issue is the current administration of the forest sector. Ongoing decentralization of authority has the potential to increase benefits to local communities but, unless it is carried out in a participatory manner, it can further marginalize poor people while creating and giving more powers to elites. Past programs have experienced some difficulties in engaging forest dependent communities in poverty alleviation activities because they have not been granted ownership or adequate use rights. Therefore, households have no incentive to protect the area or prevent encroachment.

2.5 Forest Fires

About six million ha of Viet Nam's forests are vulnerable to fire, including the entire Northwest region, the Central Highlands, the Southeast and the Mekong Delta. All have suffered extensive forest loss as a result of fire, predominantly because of slash and burn agriculture – especially in upland areas. Use of fire to hunt, collect honey, and gather waste material ranks second, followed by carelessness and arson. In addition, warmer weather and drier El Nino conditions account for a large increase in fires in 2010. Climate change projections show that the North West and the Mekong Delta are two areas which will likely experience warmer conditions.

2.6 Sustainable Forest Management

The main objective of sustainable forest management (SFM) and the National Forest Strategy (2006-2020) is to ensure resources provide a range of economic, environmental and social benefits over the long term, recognizing that forest owners must have sufficient capacity to plan and perform the tasks required to achieve goals. More precisely, the strategy aims to manage, protect, develop and sustainably use 16.24 million ha of forest land and to have 30% of the country's production forests certified as sustainably managed by 2020. Each of its five-year plans outlines the steps that need to be taken in this regard.

In 2009-2010, Viet Nam developed four models of sustainable forest management to pilot in the provinces of Kon Tum, Dac Lac and Dac Nong. Plans are to establish 9 more test sites in 2011. In July 2010, a group of households in the province of Quang Tri was the first to be certified under the Forest Stewardship Council.

Viet Nam acknowledges that society's increasing demands for forest products and services must be balanced with the need to preserve forest health and biodiversity. Doing so is critical for the survival of forests and the prosperity of forest dependent communities. Therefore, government is committed to this approach and has developed management plans, in consultation with private citizens, businesses, organizations and other interested parties. While many developing countries not only have inadequate funding and human resources to prepare, implement and monitor such plans, they also lack effective mechanisms to involve stakeholders in a meaningful way. However, Viet Nam has introduced promising initiatives, including legislation, regulations and incentives to promote sustainable forest management.

Important programs include the National Forest Development Strategy, the Five Million Hectare Reforestation Plan, the sustainable cultivation of crops on slopes, and the establishment of forest plantations. REDD+ indirectly supports SFM by providing incentives in the form of technical support, capacity building and payments based on performance of the local population to take better care of their standing forests.

3. Status of REDD and REDD+ in Viet Nam

3.1 Ongoing REDD+ Activities

In Phase I, an inventory of all activities related to REDD+ was compiled to avoid duplication and identify potential co-financing opportunities. Key international partners involved in local projects (rather than national and sub-national) include the Japanese International Cooperation Agency (JICA), Netherlands Development Cooperation (SNV), Forest Carbon Partnership Facility (FCPF), the German Development Cooperation (GTZ) and the Australian Development Cooperation (AusAID). Much remains to be done at a provincial level, where technical capacity lags behind national expertise, even though the former is vital to deal with practical matters and achieve objectives. Phase II will be especially important in terms of integrating activities, merging them into the National REDD Strategy (NRS) and incorporating aspects of REDD+, such as SFM, in the country-wide approach. Such efforts will also harmonize multi-donor activities and funding.

3.2 Ongoing REDD Activities

Foreign investors consider good governance as one of the basic conditions for committing any new or additional financial assistance to a country. In this regard, Viet Nam is close to being ready to implement REDD+, having initiated various measures and drafted several laws and decrees related to the process - all of which contribute to advancing Viet Nam's preparedness. More legislation awaits official presentation to Parliament for endorsement and ministries which will be involved in REDD+ implementation, are developing policies to put the new laws into practice.

In addition to addressing gender and good governance issues, government is formulating the NRS; devising systems to distribute benefits equitably; designing an effective monitoring, reporting and verification system; developing processes to address issues related to free, prior and informed consent (FPIC); and building capacity to deliver.

3.3 The National REDD Strategy

The National REDD Strategy is rapidly taking shape as the framework under which REDD+ will operate in the country. It will describe goals and plans, identify roles for provincial and district agencies, establish monitoring procedures, define the means to verify and report results, provide guidelines for the distribution of benefits at local levels, and cover other aspects.

Development of the NRS follows one of the two common approaches in Viet Nam where central authorities identify required activities, assess their impacts, draft an outline of the strategy, then hold extensive consultations with stakeholders. Hence, government used an iterative process to improve the document and plan eventual implementation. The result of these efforts will be a strategy that will be submitted to the Prime Minister's Office for approval, after which time it will have legal status.

This NRS process is similar to the one that FLEG-T adopted, for example, to monitor the legality of the trade in hardwood in Viet Nam. The operations of private wood-processing enterprises are being examined in an attempt to prevent leakage within the region and across international borders. Incorporating FLEG-T into the NRS would effectively address one of the serious drivers of deforestation.

As noted previously, sound implementation of REDD+ in Viet Nam requires a cross-sectoral approach. To this end, all ministries are being acquainted with the REDD+ concept so that they can work together effectively, without overlapping responsibilities. They are also being made aware of available incentives but, to reach full engagement, more needs to be done and additional measures are included in the NRS.

Given that the NRS requires the consent of all parties and relevant stakeholders, it will take time to finalize. However, the first guidelines have been prepared and the document will likely be sent to the Prime Minister for approval by mid-2011.

The main components of the NRS are:

3.3.1 Benefit Distribution System

Under REDD+, the system to distribute benefits is at the core of the programme. It must comply with general principles and meet the expectations of the international community in terms of equity, transparency, additionality and performance, while managing the revenues generated in an effective and efficient manner. Viet Nam is well placed to develop such a system because of many years of experience with similar schemes, for example the 5MHRP, and recent projects to pilot payments for the environmental services that forests provide. Another factor which favors the development of a benefit distribution system to comply with REDD+ requirements is the fact that Viet Nam's administration is sound, the country is stable, and tenure is fairly secure. In addition, Viet Nam recently undertook studies on benefit distribution systems which comply with REDD+.

3.3.2 Monitoring, Reporting and Verification (MRV)

To monitor and report outcomes to the international community, the National REDD Network is developing a tailor-made MRV system, in consultation with stakeholders inside and outside government. While it has discussed MRV requirements and options in general terms, a Technical sub-Working Group is exploring the establishment of a system under REDD+. In this

regard, it is essential to have accurate reference levels/reference emission levels (RL/RELs) based on historical data which together will form reliable scenarios. The Japan International Cooperation Agency and the Government of Finland are supporting Viet Nam's efforts in this area. So far, recent work and discussions have led to agreement on key technical points, notably the following:

- RELs/RLs will be developed for all eligible activities within the scope of the REDD+ mechanism being negotiated under UNFCCC, including deforestation, forest degradation, enhancement of carbon stocks, and sustainable forest management.
- A REL will be developed based on historical deforestation trends. Initial data on deforestation can be based on complete records or satellite imagery and supplemented with information from the 1991 forest inventory (when national circumstances induced a change in forest cover).
- Because it is more complex to generate historical RELs on forest degradation, Viet Nam is undertaking a study to extract data using high-resolution satellite imagery. However, such data is not available for the entire country or for the entire time period in question. Moreover, the difficulty is compounded by the fact that the extent of forest degradation varies over time and space.
- Sub-national RELs/RLs will be developed based on stratification of the national territory into approximately 15 eco-regions.
- Prospective RLs for carbon stock enhancement will be developed by first generating RLs based on bio-physical responses of forests for each eco-region, then factoring in and analyzing socio-economic conditions in each province, using GIS spatial overlays.
- Prospective RELs for reduction in emissions from deforestation will be based on carbon stock estimates per eco-region from the national forest inventory, in combination with an analysis of socio/economic conditions in each province, using GIS spatial overlays.
- An aggregate of sub-national RELs/RLs will be used to develop a single national REL/RL for each REDD+ eligible activity.
- RELs/RLs for Viet Nam will be reviewed and updated periodically.

3.3.3 Gender Sensitivity

Viet Nam recognizes the importance of women to the success of REDD+, given the prominent role they play in individual households and communities, especially in terms of making decisions or cooperating on such matters as the use of cooking stoves, the replacement of forest products with non-forest products – e.g. biogas and agricultural residue – or options for income generation not based on forest products.

Therefore, government will make serious efforts to involve women in REDD+ through awareness raising, education and training, and by making them responsible for collecting data on carbon stocks and including them in the preparation of forest management plans, for example.

4. Results

4.1 Summary of Phase I Achievements

Phase I of the UN-REDD Programme in Viet Nam started in late 2009 with the aim to improve institutional and technical capacity to manage and coordinate REDD activities; improve capacity to provide payment for ecological services at provincial and district levels; and improve knowledge to reduce regional displacement of emissions.

The major achievements so far have been:

- support to the National REDD Network and associated working groups
- an outline of the National REDD Strategy
- an in-depth assessment of potential benefit distribution mechanisms and presentation of options to stakeholders
- development of historical and current land-use maps
- technical methodologies and capacities to develop a national REL and establish an interim REL and RL
- the piloting of the FPIC process in 80 villages and the acquisition of important lessons
- a communication strategy, preparation of material to raise awareness, and development of a REDD website
- awareness raising of senior forestry officials, government officials throughout the administration, provincial officials, forest users and the general public
- support to partners as they initiate REDD activities, notably the World Bank and FCPF, and projects, including the development of a management information system for the forestry sector.

4.2 Summary of Lessons Learned on REDD+ in Viet Nam

Because Viet Nam has initiated many activities required for REDD+ readiness, it can serve as a source of lessons for other countries. For example, as a result of the study which the country undertook on benefit distribution systems, in partnership with IUCN, IUCN was able to secure funding from the Swedish Environment Secretariat for Asia to undertake similar studies in Cambodia and Laos. Indonesia is now designing a FPIC process and used the Viet Nam proposal to consider what modifications might be needed to meet its particular social and political conditions. Moreover, Viet Nam's REDD+ website is considered a model for the development of similar sites in Cambodia and Indonesia.

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