Record and others

Sustainable Forest Management and Model Forests in Myanmar [*1]

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Key words : Myanmar, model forests, sustainable forest management, tropical forestry, Teak

Ⅰ. Introduction

Sustainable Forest Management（SFM）has been a common goal among international forestry communities and numerous efforts have been made to make progress towards SFM since 1992. International, regional and country-specific C&I（Criteria and Indicators）for SFM are being developed and monitored to ensure good forest management practices. On the other hand, model forests are considered demonstration grounds to aim at the promotion of SFM, which are being established increasingly for testing of C&I.

In Myanmar, forest management has always involved natural forest management founded on the concept of sustained yield from rich natural forests. The exploitation-cum-cultural system known as the Myanmar selection system has been the principle silvicultural system practiced in the management of Myanmar's natural forest. This systematic management dates back to 1856, involving a history of over 140 years. Despite such a historical and scientific management background, the present forestry is facing a number of problems and issues in relation to economic, social and environmental aspects. During the period of 14 years from 1975 through 1989, the actual forest cover decreased at an annual rate of 220,000 ha or 0.64% of the actual forest area. Fully aware of the significance of these social, economic and environmental aspects in implementing SFM, Myanmar developed its own C&I for SFM at both the national level and forest management unit level in 1999 within the framework of the ITTO's original C&I. By the Forest Department of Myanmar, with the cooperation of Japanese NGO, JOFCA has established the Oktwin model forest in the Bago Yoma region for testing of C&I for SFM at a local and field level. As the second model forest, the Pauk Khaung model forest has also been established in the Bago Yoma region. The Forest Department of Myanmar and Japanese NGO, JIFPRO share a common interest in promoting the SFM in the teak bearing natural tropical forests of the Bago Yoma region. Myanmar is linked to the International Model Forest Network.

Ⅱ. Forest Resource Base

Myanmar, a tropical country in continental South East Asia with a total area of 676,577 km^2, has a common boarder with China, India, Laos, Thailand and Bangladesh. Approximately 75% of the country lies within the tropics. Apart from its wide latitudinal range, it also has an altitudinal range from sea level to the snow capped peaks of over 5,727m. Consequently, it has a wide range of temperatures. The rainfall which is distributed over five months of the year ranges from about 500mm to about 5,000mm. All this contributes toward a wide variety of environmental conditions and diversity in the types of forests that exist within the country.

The forests of Myanmar are rich and diverse in flora and fauna and are ecologically complex. It is known to have about 7,000 plants species, of which 1,071 are endemic. The bamboos of this area include 96 species. The analysis of the 1989 Landsat TM imageries has indicated that about 43% of the country area is under closed forests and another 30% is under woodlands. Closed and degraded forests, which can be considered as actual cover, constitute 34,376,700 ha or approximately 51% of the total area of the country. These forests include:（1）tropical evergreen forest,（2）mixed deciduous forest,（3）dry forest,（4）deciduous dipterocarpus forest,（5）hill and temperate evergreen forest,（6）tidal, beach and dune, and swamp forest.

The most common forest type is mixed deciduous forest and it represents about 39% of the total forest area. Teaks found in mixed deciduous forest are of better quality, for example, the

[*1] トワル キャイン カイ・甲斐重貴・溝上展也：ミャンマーにおける持続的森林経営とモデルフォレスト
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best teaks grow in moist upper mixed deciduous forest. Of approximately 19 million ha of the world's natural teak forests, 16.5 million ha or 86.7% are occurs in Myanmar. The Bago Yoma region of Myanmar is renown as a legendary home of natural teak stands.

Ⅲ. Bago Yoma Region

The Bago Yoma region, where the two model forests have been established, is in the Bago Division. The Bago Division occupies the southern part of the central basin of Myanmar and the climate is tropical. It is generally low-lying except in the center where the Bago Yoma region is running from north to south and forms the backbone of the region.

The Bago Yoma region covers roughly an area of 1.5 million ha. The Bago Yoma forests consist of mixed trees of various species intermingling with vast stretches of bamboo. At present, the large tracts of natural teak bearing forests can be seen only in the Bago Yoma region. The foremost working plan of the Myanmar forest was prepared for the Taungoo district, where the Oktwin model forest has been established as early as in 1857. At that time, yield regulation was the primary emphasis on teak. In fact, the modern forest management system in Asia and the Pacific Region began with this teak (the Burma selection system) evolved by Dr. Dietrich Brandis. This doctor was a trained German forester hired by the British to oversee the administration and management of the vast and complex Bago forest, and to bring in some form of systematic and scientific management of the forest in 1852 . He drew up the first working plan for the Bago Yoma teak forests based on ring counting and the observation of trees of known age. He calculated that it took 24 years for teak trees between 1.4m to 1.9m in girth to become yield trees of 1.9m and over in girth. Accordingly, he prescribed that $1/24^{th}$ of the number of yield trees should be cut annually. The numbers of yield trees were estimated by Brandis from linear valuation surveys. This silvicultural system forms the basis for the present management method, which was known as the Brandis Selection System, however, later it was modified into the Burma (Myanmar) selection system which spread to India and Thailand over the next 40 years. The basic theories and practices of teak forest management were subsequently applied to non-teak forests, and have laid the foundation of many forest management systems throughout the region. The Myanmar selection system which became well established by the year 1920 has been enforced and widely practiced throughout the country until today. Moreover, the first attempt of teak plantation by the taungya method, which is renowned worldwide as an agroforestry system today, was initiated as early as 1856 at Tharyawady in the Bago Yoma region. Tropical forests of the Bago Yoma Region with such a historical background are chosen as the model forest sites, aiming to manage the teak bearing tropical forests sustained as the forests which play an essential role in the livelihood of the local inhabitants in this region.

Ⅳ. Oktwin Model Forest

The Oktwin model forest has been established in the eastern part of the Bago Yoma Region by the Forest Department of Myanmar in the Executing Agency. The Japan Overseas Forestry Consultant Association (JOFCA) cooperated technically and financially and the FREDA (Forest Resource and Environment Development Association), the sole NGO in forestry in Myanmar, acted as local consultant of the JOFCA.
The area of model forest is about 54,032 ha and straddles the two townships of Oktwin and Taungoo, with the majority of it in Oktwin. It comprises part of Kabaung, Pyukun, Myayarbinkyaw Reserved Forest, the whole Kabaung (extension) and Bontaung Reserved Forest, unclassed forest XVI, unclassed forest XVII, part of unclassed forest III and unclassed forest XVIII.

There are about 6,950 households with the total population of about 309,129 in the two townships. In both townships about 70% of the populations are rural residents, while the economic base is primarily agriculture. Since the residents are quite close to Bago Yoma natural teak bearing forests and are well acquainted with forestry related activities, many of the rural dwellers have engaged in forestry operations such as teak girdling, hardwood marking, forest plantation works, logging and timber extraction.

The elevation in the western and northwest area is relatively high but not exceeding 650m. The underlying rock is either sandstone or shale. Yellow-brown forest soils are the dominant major soil group, suitable for the growth of teak. Annual rainfall ranges between 1,500mm to 2,000mm with an average of about 125 raining days commencing from mid-May. The dominant forest types are moist upper mixed deciduous forest (51,248 ha), dry upper mixed deciduous forest (2,852 ha) and lower mixed deciduous forest (203 ha) in some low land area. Moreover, patches of evergreen forest and dipterocarpus forest are occurring depending on micro-climatic conditions and edaphic factors. Teak grows very well naturally in mixed deciduous forests together with its associates such as Pyinkado (Xylia Kerri), Pyinma (Lagerstromia speciosa) and bamboo. Because of its geographical position and ecological characteristics, the model forest area has been assessed to represent the Bago Yoma natural teak production forest. The Bago Yoma forests, including the model forest, have been subjected to continuous timber harvesting since 1850s on the sustained basis. The selection of trees that fell is done on both girth limit and silvicultural reasons, while almost all of the skidding activities are done by animal power (elephant). It has been considered that the negative impacts on forest ecosystems and environments are relatively minimized.

The Myayarbinkyaw Reserved Forest, unclassed forest III and XVIII have been subjected to the introduction of community forest to meet the basic needs of the rural communities. An area for biodiversity conservation designated as MRA (Managed Resource Area) has been boundary-demarcated in the model forest and is managed for production of timber and non-wood forest products as well as for the conservation of genetic diversities by maintaining mosaic of older and larger stands of teak and its natural associates. In connection with MRA, development activities for ecotourism and outdoor recreation has been initiated and developed. Furthermore, the SeinYe Forest Resort in the model forest area is a well established tourist destination.

There are some Karen and Mon ethnic groups are residing in and around the model forest as well. The numbers of their villages totaling 15 have been settled since 1960s. These indigenous people can be seen as part of the nature in the model forest due to their long-time residence and their subsistence farming in harmony with the surrounding environment.

In assessing SFM, the establishment of a model forest was linked to the field testing of C&I identified. It is better noted that one aim of implementing C&I at the forest management unit level is to link C&I to timber certification. The Oktwin model forest has thus been established with the primary purpose of developing a system to monitor the SFM.

Ⅴ. Pauk Khaung Model Forest

The Pauk Khaung model forest has been established in the western part of the Bago Yoma in Pyay District of the Bago Division. The project was initiated by the Forest Department of Myanmar in collaboration with the Japan International Forestry Promotion & Cooperation Centre (JIFPRO), an NGO from Japan in August 1999. The primary objective of establishing the Pauk Khaung Model Forest is to build strong partnerships among the stakeholders for the sustainable development of forest land and resource in support of environmental conservation and enhancement of the social and economic well-being of local communities residing in the Pauk Khaung model forest area.

The primary land use of the Pauk Khaung model forest area is forestry. The project covers the entire Pauk Khaung Township of 190,838ha. In fact, model forest activities are being concentrated in the upland catchments of the North Nawin and South Nawin dams. Model Forest Project Area (MFPA) or the catchment areas where concentrated model forest activities are being undertaken is 129,965 ha. The elevation of land surface from sea level ranges between 500m to 600m in the east and between 100m to 200m in the west. The width from east to west is 40 km and 46 km from north to south. The climate consists of hot and cold season with annual average rainfall of about 1,170mm, usually not exceeding 1,270mm. Sandy to clayey soils are common with alluvial soil in valley areas.

Out of the total land area of Pauk Khaung Township, reserved forests (73,581 ha) and other forests (9,527 ha) constitute up to about 44% of the total area. Other forests include protected public forests, proposed protected public forests and unclassed forests. The mixed deciduous forest is a common forest type. About 59.32% of MFPA is covered by mixed deciduous forest and moist forests mixed with bamboo and semi-indaing forests which are commercially important. About 9.7% of the land is covered by scrub land, either mixed with bamboo or grassland. This scrub provides ground cover, which could support fodder and firewood. The area occupied by shifting cultivation together with forest lands infested by taungya represents 21.56 % of MFPA, while permanent agriculture occupies about 4.09 %. The human settlement area shares only 0.05 % of the land and streams and water bodies occupy 5.28%. Pauk Khaung is one of the best natural teak habitats in Myanmar. Tree species including Teak (Tectona grandis), Pyinkado (Xylia Kerri), Padauk (Pterocarpus macrocarpus), Ingyin (Pentacme sismensis) etc. are growing along with bamboos and vines.

There were 21,746 households with the total population of 108,732 in 1998. Karen and Chin ethnic groups were interspersed with Bamar in the area. More than 85% of the population in rural area has traditionally been dependent on forest resources both for daily necessities and for business purposes as well.

A detailed study on the existing land use has been conducted in the North Nawin catchments because siltation and sedimentation were severe in the north reservoir. Precautionary siltation check dams were constructed in the immediate catchment areas. The establishment of community-owned forests for about 40 ha has been undertaken in the watershed area. Enrichment planting has been done in Kyatkon Forest Reserve in the North Nawin dam.

The Forest Department and Myanmar Timber Enterprise, sister agencies in the forestry sector of Myanmar, are the core partners in the Model Forest Partnership Group. The intersectoral partnership include all related agencies such as The Forest Department, Myanmar Timber Enterprise, Myanmar Agricultural Service, Land Record Department, Irrigation Department, Veterinary Department, Livestock Breeding Department, Fisheries Department, local communities and local administrative bodies. Local NGO such as FREDA could also be a significant partner with the multi-perspective environmental concern. The Forest Department is the most important party which is responsible for the successful development of the Model Forest Management System in Pauk Khaung Township. The Forest Department and Myanmar Timber Enterprise jointly prepared the scheme to harvest timber to ensure not to exceed the annual allowable cut and also that environmentally undesirable impacts are minimum.

The seed production area (60.65ha) was established in natural forests and plantations 30 years in age and for good performance in the model forest area.

Ⅵ. Conclusion

The Forest Department of Myanmar finalized its C&I for SFM after testing them in the field. Moreover, the Oktwin model forest is established for this purpose. These C&I should be used to measure the trend of the current forest management practices toward sustainable development. These can also be used to measure SFM through the implementation of Pauk Khaung model forest activities.

Both model forests include a managed resource area and seed production area that are of national and regional significance in the sense of conserving the gene pool for teak because most of the high-quality natural teak stands have disappeared elsewhere in the region including India, Laos and Thailand.

So far, two model forests have been established in the tropical Bago Yoma region. These model forests will exchange their experiences of successes as well as their failures at the local level, thereby developing new ideas and new approaches. Model forests are also to be established in different ecosystems outside the Bago Yoma region, such as the dry zone of Central Myanmar and mangrove ecosystem in the near future. As the SFM will become more important in the future, the development of a field-level application of model forest concepts are essential not only at present but in the future as well.

Acknowledgement

Some sentences and parts of this report were obtained from the below references. We are grateful to the authors. Furthermore, we thank Fusako Matui, JIFPRO, for providing us publications on Model Forest.

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