



STATUS OF MANGROVE ECOSYSTEM CONSERVATION IN MYANMAR

Ei Thandar Bol

Master Student, Beijing Forestry University, Qinghua East Rd, Haidian, Beijing, China

ABSTRACT

Myanmar has more than 2.00 km coastlines along the Bay of Bengal. Generally, it comprises the Rakhine, Ayeyarwady Delta and Tanintharyi regions, where mangroves are common. Due to expansion of agricultural lands and excessive cutting for fuelwood, mangrove forest cover in Myanmar has been decreasing and changing to other land use. Forest Department has been attempting to rehabilitate and conserve mangrove ecosystem and also jointly implementing mangrove conservation projects in cooperation with international organizations such as UNDP/FAO, JICA and local NGOs. In cooperation with JICA, Forest Department, has been implementing a project namely “Integrated Mangrove Rehabilitation and Management Project through Community Participation in the Ayeyarwady Delta” from 2007 up till 2013. The major activities to be done by the project are establishment of community forestry, implementation of action research plantations and construction of Community Forestry Extension and Nursery Centers in the Ayeyarwady Delta. One project “Sustainable Community based Mangrove Management in Wundwin Reserve Forest” in Rakhine State, jointly cooperation with Forest Department and FAO has been implemented to develop Integrated Mangrove Management Plan for two years from 2009 to 2011.

KEY WORDS: Mangroves Ecosystem, Land use, Rehabilitate, Conservation.

INTRODUCTION

Mangrove forests are situated within the tidal limits and are found in the delta and on sheltered muddy coastal areas. Their distribution is world-wide and is usually considered as occurring in two zones. The eastern zone comprises the east African coast as well as the coasts of Pakistan, India, Myanmar, Malaysia, Thailand and the islands down to Australia. The western zone includes the coasts of America and the Caribbean and West Africa. About 46% of the mangrove forest of the world occurs in Asia (Aksornkarn 1995). Soil, water, plant, wildlife species and nutrients are the physical, chemical and biological components of the mangrove ecosystem. Flood control, storm protection, products of wildlife, fisheries and forests are the function attributed by the mangroves. In addition to the above values and function, it also helps conserve the biological diversity and cultural heritage. Mangroves play an important role in sustaining diverse species of wildlife which includes avifauna, marine and mammals by providing rich habitats and healthy environment. It contributes better socio-economic life of the people. It provides important source of protein, fruits, vegetable and medicinal plants, timber, firewood and roofing materials. Fish and wildlife of mangroves give a considerable contribution to human welfare in the form of food for rural people. Mangrove forests protect the storm and erosion, on the coasts and estuaries. They generate income from fishery and support cultivation by providing rich nutrients. Mangroves also accentuate as feeding and nesting places for water fowls.

Functions of the mangroves are as follows

a) Flood Control

By storing the water and releasing gradually, wetland can reduce the destructive effect of flood at

downstream. Rain water collected in wet period serves as water lakes and also provides water in the downstream.

b) Shoreline Stabilization/ Erosion Control

Mangrove forests protect the coast from erosive force of waves, storms and currents; it also holds the sediment by plant roots. It is the most productive ecosystem, with its rich diversity of flora and fauna.

c) Storm/ Wind break

Mangroves and coastal forests protect and lessen the damage of storms and floods.

d) Micro-Climate Stabilization

The overall hydrological, nutrient and material cycles and energy flows of mangroves moderate local climatic conditions.

e) Water Transport

Mangroves at inland and coastal areas provide convenient transport for the rural people.

f) Recreation/ Ecotourism

Sport hunting, fishing, bird watching, nature photography, swimming and sailing are the attractive events for recreation and ecotourism in mangroves.

g) Forest Resources

Fuelwood, timber, bark, resins and medicinal plants are the forest products that mangroves yield.

h) Wildlife Resources

Mangroves are rich in wildlife and recreational resources. Wildlife commercial products are meat, skins, honey, eggs of birds and turtles.

i) Fisheries

Nutrient rich mangroves provide shelter for spawning and habitat for fish.

j) Fodder and Forage Resources

Grasslands and trees that are grazed by livestock are important to pastoral communities.

k) Water Supply

Mangroves are resources of water for humans, agriculture, livestock, industries and flood control.

Problems

In Myanmar, mangrove forests were significantly reduced over the last decades by the indiscriminate felling for firewood, the development of agriculture and due to population growth. Deforestation of the mangrove forests couple with the degradation of coastal watershed have increased upstream erosion and undermined the sustainable multiple resource uses and potential of the natural resources bases. Reforestation of mangrove forests therefore is a high priority issue. Proper management plans, based on ecological data and natural values of mangroves could contribute to sustainable and multiple uses of mangroves that could contribute to environmentally sound and sustainable development. Though Myanmar's mangroves are important in many ways, only few proposed sites have been designated and protected legally. The increasing population is continually mounting pressure on the mangrove resources of the country. The mangrove resources are being over-exploited for the basic needs of the people, especially firewood and charcoal. Expansion of agriculture and human settlement are also the main causes of destruction of mangroves. Erosion and siltation due to deforestation in the upper reaches of the river systems are other reasons for the degradation of mangrove ecosystems.

In Myanmar, mangrove ecosystems are of great importance to the economy of local population. Firewood, and charcoal, poles, timber, honey, bee wax and fish are the biological benefits accrued by the local communities. Fish and shrimp are the major products of mangrove. The income generated from the products of mangroves will not be available when mangroves are destroyed. The consequences of mangroves loss will therefore be more severe in developing countries.

MATERIALS & METHODS

Topography soil and Climatic condition

Most of the areas in Delta region are quite flat alluvial origin, except sand ridges located in certain area. Almost all the areas are submerged at spring tide during the rain. However, equinoctial tide days are the only time certain areas can be submerged in dry season. Generally, the soil is clay and clay loam, except sandy ridges. It is very plastic and sticky. The soil with slight acidity (pH 7.0-6.0) was observed in delta where *Phoenix paludosa* grow densely and the forests are seriously degraded. Conversely, acidity (pH 5.0) increases in the soil of abandoned paddy field (Kogo, 1992). Due to low moisture content in soil, cracks can be seen on the surface in the dry season. In the south of the delta, the soil tends to have a uniform texture and being washed by salt water, it becomes stiff and clayey as salinity increases. Due to the tidal wave action, formation of humus is seldom possible and stiff clay hardens and

cracks on the surface during low tides. In general, the climate condition of delta is tropical monsoon climate with high temperature and abundant rainfall. Delta received heavy rainfall primarily because of the alignment of the mountain ranges. The climate of delta is characterized by three seasons. These seasons are rainy season, from the middle of May to October, a cold season from November to February and the dry season from the March to middle of May. The rainfall received is above 2500mm annually in delta. The heaviest rainfall was found at Laputta Township approximately 3600mm and gradually decreased towards the northern part of the delta. Average rainy days of AYWD delta are about 80 days to 110 days per year. Daily mean humidity is nearly 60% in March and April. The average minimum and maximum temperature are about 65°F and 95°F, so the average mean is about 80°F.

Tidal action and their influences

In the delta area, the ground levels are usually classified according to frequency of tidal inundation. The duration of each rise or fall of tide lasts six hour, and it takes place about 48 minutes later each day. Basically, the mangrove dwellers understand the daily tidal conditions by calculating the days contained in the Myanmar lunar calendar. Two portions, waxing and waning, can be separated in Myanmar lunar calendar. Each portion has 14 to 15 days depending on individual month. The table 1 gives the approximate time of rises. The spring tide can be seen in every 3rd of waxing and waning day. During the spring tide days most of the areas are inundated. Every 10th of waxing and waning is the neap tide, *i.e.* the lowest tide. It is considered that the possible height of ground levels for mangrove plantation is between 1.3 meter and 2.4 meter above admiralty datum's. It means mangroves can survive only the extent of 1.1 meter in inundated level difference (Kogo, 1992). Tidal range depends mainly on the topography and distance from sea.

Soil water

During the rainy season soil water is quite sufficient in all the mangrove areas because of much rainfall and tidal inundation. Due to high evaporation and less tidal inundation, the availability of moisture on high ground levels is very serious in dry season. Shortage of soil water depends on the ground levels affected by tidal inundation. Frequency of tidal inundation strongly influences availability of soil water in the dry season. According to the observation on high ground level at low tide in dry season, no moisture content was found until 30-cm depth of the soil. The soil is extremely hard, and appears many deep cracks on the surface. Soil moisture was seen beyond 30-cm depth of the soil. The deeper the soil is, the higher the moisture content. The ground water was observed at the depth of 150 cm. The ground water level is therefore related to the tide level (Kogo, 1992).

TABLE 1 Tide table according to Myanmar dates

Day, waxing or waning	Time of rise A. M/P. M.		Nature of the tides
	Hours.	Minutes.	
(1)	(2)	(3)	(4)
First	7	12	High rise. (yehta)
Second	8	0	High rise. (yehta)
Third	8	48	Highest rise, spring tide (gaungye)
Fourth	9	36	Almost as high as gaungye (yesahmi)
Fifth	10	24	The beginning of the low rises (yethe-u) <i>i.e.</i> , medium rise (lower each day)
Sixth	11	12	The beginning of the low rises (yethe-u)
Seventh	12	0	The beginning of the low rises (yethe-u)
Eighth	12	48	Low rise (yethe)
Ninth	1	36	Low rise (yethe)
Tenth	2	24	Lowest rises, neap tide. (yesinsin-the)
Eleventh	3	12	Small rise (yenutha)
Twelfth	4	0	Small rise (yenutha)
Thirteenth	4	48	Small rise (yenutha)
Fourteenth	5	36	The bbeginning of the high rise (yehta-u) <i>i.e.</i> , medium rise (higher each day)
Fifteenth	6	24	The beginning of the high rise (yehta-u) <i>i.e.</i> , medium rise (higher each day)

Source: Report on Reforestation techniques applied in the Ayeyarwady mangroves, 1992

Salinity

Salinity of river water is firmly related to the distance from the sea, topography, tidal action and the rain. During the rainy season the river water is found with low salinity at the neap tide. The farther away from the sea is, the lower the salinity. In the rainy season, the salinity of river water is almost fresh or 0.1%. However, the salinity in dry season is quite different. In dry season, minimum salinity (0.2%) was observed at Pathein, which is 100 km far from sea. Gradually, it increased towards the river mouth. The salinity at the point which is 25 km distant from sea was noted down 2.8% as a maximum (Kogo, 1992).

Methodologies for Conservation Action

There are three methods in conserving the degraded mangrove forests as follows:

1. Natural regeneration with effective protection
 2. Regeneration improvement felling (R.I.F), and
 3. The integrated approach
- 1) Natural regeneration with effective protection
Natural regeneration operation with effective protection should be carried out in areas where regular tides reach at least 10 to 12 days per month twice a day. Tidal current always brings in water borne seeds and propagates, which can readily regenerate on any type of soil as long as there is sufficient moisture in the ground.
 - 2) Regeneration improvement felling (R.I.F)
The mangrove ecosystem is a very complex as it contains unusual undergrowth which prevents and suppresses the existing natural regeneration for many years. Regeneration improvement felling was the opening-up of the undergrowth to allow the suppressed regeneration to grow up.
 - 3) The integrated approach
The underlying principles of this approach include the followings:

- (i) Integration of mangrove ecosystem conservation with development needs of rural people;
- (ii) Raising of conservation awareness among communities on the values of mangrove resources;
- (iii) Rehabilitation of degraded mangrove forests through effective protection and management through participation; and
- (iv) Rehabilitation of denuded mangrove forests by plantations and community woodlots.

Zonation has to be made and they include: Protected Reserve Area (PRORA), Special Management Area (SMA), Multiple Use Zone (MUZ), and Buffer Strip (BS). Different zones have different management objectives with appropriate activities.

RESULT & DISCUSSION

All mangrove areas are managed under the management of the country as public land and are managed by the Forest Department under the Ministry of Environmental Conservation and Forestry in Myanmar. To conserve the mangrove forests, the Forest Department started to replant plots of mangrove in 1975. From 1991 to 1993, the Forest Department in collaboration with the United Nation Development Program (UNDP) and Food and Agriculture Organization (FAO) carried out a feasibility study on mangrove projects in Laputta and Bogalay townships in the Ayeyarwady delta. Planted areas in Mangrove Regions are given in Table 2. These plantations have been established by Forest Department alone. In 2008-09, Nargis Cyclone was destroyed most of the mangrove plantation areas so there is no specific data of plantations in Delta region before 2008-09. In order to protect and conserve the depleting mangrove resources in time, the Integrated Resource Management Approach is now being implemented. The goal of the new approach is the environmental management and economic development of Myanmar and its people. The outcomes of the

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conservation action will particularly complement: Environmentally sound and sustainable development of the mangrove resources;

1. Formation of representative mangrove ecosystem as part of the national heritage, gene pools and also for research;
2. The awareness of the importance of mangrove

conservation and its benefits to the people.

There are some important factors that can delay conservation of the mangrove ecosystems;

1. The invasion of paddy lands into mangrove forests
2. The overproduction of forest products
3. The illegal cutting of trees

TABLE 2. Establishment of Forest Plantations in Delta Region in Acres

Year	Yakhine	Ayeyarwaddy	Tanitharyi	Total
2009-2010	400	3000	-	3400
2010-2011	15	2450	100	2765
2011-2012	200	1500	-	1700
				7865

CONCLUSION

It may be concluded that by its very nature, the actions will help conserve the biodiversity of mangroves, the ecosystems and the genetic resources of Myanmar in due course of time. Mangrove ecosystem could be rehabilitated with effective protection and systematic management. Activities undertaken for the conservation of mangrove forests include community forestry, nursery establishment, plantation establishment, seed and seedling distribution, natural regeneration and gap planting, river-bank erosion control measures, distribution of improved cooking stoves and provision of extension services.

RECOMMENDATIONS

Myanmar is keenly aware of the threats to its mangrove ecosystems and resources. The following actions are solicited for better conservation of the mangrove ecosystems of Myanmar.

1. Development of policies for mangrove management
2. Documentation and preparation of a check list of birds, reptiles and mammals of mangrove
3. Conservation of the biological diversity of the mangrove ecosystems
4. Protection and management of wildlife

ACKNOWLEDGEMENT

The author would like to thank all the members of the Beijing Forestry University and the APFNet Scholarship Organization for their morale and financial support.

REFERENCES

- Aksornkoae, Sanit (1993) Ecology and Management of Mangroves. IUCN, Bangkok.
- Kyaw Tint and, Shwe Kyaw (1992) Inventory of Mangrove Forests in Laputta Township. Department of Forestry, UNDP, FAO, Union of Myanmar.
- Kogo, Motohiko (1992) Report on Mangrove Reforestation in Ayeyarwady delta.
- Pe Thein (1990) Note on Mangrove Forests of Myanmar.
- Nay Win Oo (2002) 16:218–223, Present state and problems of mangrove management in Myanmar Trees, DOI 10.1007/s00468-001-0150-6
- Bo, S. (1992) Assessment of change of mangrove forests in Ayeyarwady Delta using remote sensing data, Workshop Technical Papers. Ministry of Forestry, Rangoon, Myanmar
- Forest Department (1997) Country Report – Union of Myanmar. Asia-Pacific Forestry Sector Outlook Study, Working Paper No: APFSOS/WP/08. Ministry of Forestry, Rangoon, Myanmar.