## Appendix 3. Country papers/presentations

### Coastal forest rehabilitation and management in Bangladesh[2]

*Md. Mozaharul Islam, Deputy Conservator of Forests, Divisional Forest Officer, Sundarbans West Forest Division, Khulna, Bangladesh*

## Introduction

Bangladesh is a tropical maritime nation on the northern border of the Bay of Bengal. The coastal region lies between latitude 21° to 23° north and longitude 89° to 93° east. The coastline is approximately 710 kilometres long and the coastal zone covers an area of about 2.85 million hectares, which is 23 percent of the country's total area. The coastal region includes offshore islands, mudflats, chars and new accretions. Because of the large population (140 million) in a very small country (147 570 square kilometres), the coastal areas of Bangladesh are densely populated. More than 35.10 million people live here. Agriculture is the main occupation in the zone. Other important occupations include fisheries and salt production. With respect to natural resources such as gas and minerals and further prospects for aquaculture, capture fishery, salt production, the zone has the potential to make a significant contribution to the national economy. However due to the geomorphology of the area, the coastal zone is particularly susceptible to tropical storms and tidal surges which occur frequently in the Bay of Bengal. These natural calamities ravage the area almost regularly and are considered the greatest hindrance to the development of the region and the country as a whole. For this reason, mangroves as coastal shelterbelts are considered most important for the country.

The coastal zone has extensive areas of both natural and planted mangrove forest. Natural forest includes the Sundarbans, the Chakaria Sundarbans and fringe mangroves along the eastern coast. The Sundarbans is the world's single largest tract of mangrove forest and in terms of mangrove biodiversity, the richest forest in the world; it is a Ramsar site, part of which has been designated as a World Heritage site. For about a century the Sundarbans has enjoyed the status of Reserved Forest and has been managed for its productive value.

After a cyclone devastated the coastal region in the 1960s — except for Khulna District, which is protected by the Sundarbans — coastal afforestation with mangrove species was initiated to protect life and property from cyclones and tidal surges. Later, industrial raw material and fuelwood production, conservation of coastal ecosystem and the environment, protection of wildlife and aquatic resources, protection of agricultural land against salt intrusion, tourism, poverty reduction and enhancing land accretion were added to the objectives of development programmes. In this context, over the last four decades the Forest Department has successfully implemented several massive projects (Box 1) and has established some 148 000 hectares of mangrove plantations scattered over on- and offshore areas mostly along the central part of the coast.

[2] This paper was not presented at the meeting.

**Box 1. Projects/schemes for coastal forests executed by the Forest Department, Bangladesh**

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 Project in the coastal regions of Chittagong, Noakhali, Barishal and Potuakhali (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 (2005–05 to 2009–10).
10. Management Support Project for Sundarbans Reserve Forest (2005–06 to 2009–10).

## The pre-tsunami status of coastal trees and forest resources and the forest-related impacts of the tsunami

Reportedly the coasts of Bangladesh and West Bengal in India were not affected by the tsunami of 2004 as the sea was at low tide. As in other parts of the world, mangrove habitat degradation is evident. Despite a long history of management the Sundarbans is said to be experiencing degradation — a decline in crown density and change in vegetation composition in favour of less valuable seral species (*Excoecaria agallocha*) are well-established facts. Causes are probably attributable to changes in the physical environment (e.g. changed sedimentary condition, increased salinity) and overexploitation of resources. Along the southern margin, the forest is shrinking owing to wave-induced erosion. During the 1980s the entire Chakaria Sundarban was converted into shrimp ponds on the grounds that the substrate in the area was too saline to support productive mangrove forest. The scattered fringe mangrove along the eastern part of the coast is not under any management and is disappearing rapidly due to shrimp pond conversion.

Plantations are generally in good condition and early plantations are now approaching maturity. However in places, they are subject to degradation and encroachment. A second generation of plantation needs to be established to sustain the shelterbelt along the coast.

The urgent need to rehabilitate these natural and planted mangroves and develop forestry practices to establish second generation mangrove plantations is appreciated by the government and steps have been taken accordingly.

## Implementation of coastal forest rehabilitation: Issues that have emerged and lessons learned

The Sundarbans Forest Department has implemented rehabilitation programmes such as Assisted Natural Regeneration (ANR, 5 000 hectares) and Enrichment Planting (EP, 10 000 hectares) under the Sundarbans Biodiversity Conservation Project with financial assistance from the Asian Development Bank. The success of these programmes is highly variable and generally they can be viewed as unsuccessful. The main reason for this failure has been inadequate knowledge about ecological processes in the mangrove habitat. For the rehabilitation of degraded mangrove plantations, which are presently thought to be unsuitable for mangroves, the Bangladesh Forest Research Institute (BFRI) has worked over the last two decades to select appropriate species. The development of a second

generation of coastal plantations has also been studied by the BFRI and it has made concrete recommendations.

In addition the Forest Department has raised 2 500 hectares of nipa plantation and created 650 kilometres of strip plantations; it has also distributed 1.40 million seedlings for homestead plantation for improvement of livelihoods in the impact zone surrounding the Sundarbans. To build a green (tree) belt along the coastline (except the Sundarbans region), from 1995 to 2002 the Forest Department also implemented the Coastal Green Belt Project and planted 8 934 kilometres of rail, road and embankment sides as well as 635 hectares on foreshore islands with people's participation.

The Forest Department has taken up the Coastal Char Land Afforestation Project (2005–2006 to 2009–2010) at a cost of Tk.180 million[3] which will involve following major activities:

- Raising mangrove plantations with keora (Sonneratia apetala) and baen (Avicennia officinalis, Avicennia alba, Avicennia marina) on 11 150 hectares.
- Rehabilitation of old plantations with non-mangrove species on 2 500 hectares with people's participation.

The Forest Department has also proposed the second phase of the Forest Resources Management Project at a cost of US$70.18 million (external support) that will include raising 33 568 hectares of coastal plantation over a five-year period.

Thus it is evident that the two major issues hindering the government's mangrove resource conservation initiatives are paucity of funds and appropriate technical knowledge.

## 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 policy implementation. Other institutions involved are 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 the coastal areas. It is committed to conserving the resources and ecosystems of the Sundarbans (Statement No. 9). Other statements for the establishment and management of the "priority protection areas", conservation of the forests of natural origin, exclusive use of state-owned reserved forest for forestry purposes only and promotion of ecotourism are directly relevant to mangrove forest conservation in Bangladesh. Regarding coastal forest, the Coastal Area Policy (2005) has a similar commitment. It generally emphasizes sustainable development in the coastal region and thus directly supports the establishment of coastal plantations and conservation of existing coastal forests and preservation of coastal habitats.

Protection of the country against natural disasters is the main objective of the national Environment Policy (1992), which focuses on the maintenance of ecological balance and sustainable development. The Environment Policy encompasses important sectors like coastal forest, wildlife, biodiversity and the marine environment as well as ecologically critical zones.

## Key needs to support short- and long-term efforts for coastal forest rehabilitation and management

As a field officer of the Forest Department the author considers that the following support is urgently needed for the successful implementation of short- and long-term efforts in coastal forest rehabilitation and management:

[3] US$1.00 = Tk.69.40 (December 2006).

1. *Generation of a knowledge base on the mangrove ecosystem and ecological processes through empirical studies:* Although Bangladesh has had a long and successful history of mangrove forest management most of the successes came through trial-and-error approaches adopted by the field staff. On the one hand this is expensive and time-consuming and on the other hand it is not readily extrapolative. It is important that the techniques are standardized — but this needs empirical studies. Thus it is underscored that future mangrove rehabilitation projects should address this issue.
2. *Training of field staff:* Once the mangrove forestry techniques are standardized, staff and officers at the field level should be trained. Training of officers, particularly on mangrove ecology, is highly desirable. This will enable them to devise appropriate strategies for their tasks.
3. *Technical advice:* Although Bangladesh has the longest record of mangrove resource management, most of the successes came via trial-and-error approaches. Thus the knowledge is mainly inconsistent. Provision for technical assistance in appropriate fields might enhance the success of mangrove rehabilitation efforts.
4. *Financial assistance for infrastructure development and implementation of rehabilitation programmes:* Coastal areas are generally remote, have a poor communication infrastructure and are hard to live in. For effective management of the coastal forest the effort must be backed by appropriate infrastructure, logistical and communication facilities.
5. *Cooperation among interministerial bodies and collaboration between the Forest Department and local institutions:* It has already been mentioned that various national policies are relevant to coastal forest resource conservation and extension. Thus the ultimate success of the initiative depends on successful cooperation among various interministerial bodies and also among local residents. So, it is important that the mangrove rehabilitation programme works in harmony with the Integrated Coastal Zone Management programme.
6. *Generation of information and development of a database on ecological issues and processes at the regional level:* As in other developing nations, effective coastal forest conservation is constrained by the inadequacy or unavailability of necessary information/data. So, appropriate steps should be taken for the generation and storage of data covering all aspects of coastal resources. There should be effective collaboration among the Space and Remote Sensing Organization (SPARRSO), the Resource Information and Management System (RIMS) of the Forest Department, the Meteorological Department and the Bangladesh Bureau of Statistics.
7. *International collaboration:* In Bangladesh there are very limited facilities for forecasting natural calamities. Collaboration in this context with neighbouring countries is particularly important. In addition, as neighbouring countries have similar coastal resources and problems, transboundary cooperation is likely to benefit mangrove resource conservation initiatives in Bangladesh.

## Conclusion

Bangladesh is blessed with extensive mangrove resources, which are vital for the maintenance of the environment and sustainable development of the country. The Forest Department has been entrusted with the responsibility of management of this precious resource for more than a century. So far it has been considerably successful in this context. However there is still an opportunity to improve efficiency and mangrove forestry practices need to be standardized. This necessitates knowledge on ecological process, cooperation among related national and international organizations and adequate financial support.

## Bibliography

**Karim, M.R.** 2005. *Priorities for rehabilitation, current activities and needs for mangroves and other coastal vegetation of Bangladesh: A discussion paper*. Presented in the Regional Workshop on Rehabilitation of Tsunami-affected Forest Ecosystems: Strategies and New Directions, 7–8 March 2005, Bangkok, Thailand.

**Ministry of Environment and Forest.** 1992. The Environment Policy, 1992. Government of Bangladesh.

**Ministry of Water Resources.** 2005. Coastal Area Policy 2005. Bangladesh Gazette. Government of Bangladesh.

**Ministry of Environment and Forest.** 1994. Forest Policy 1994. Government of Bangladesh.